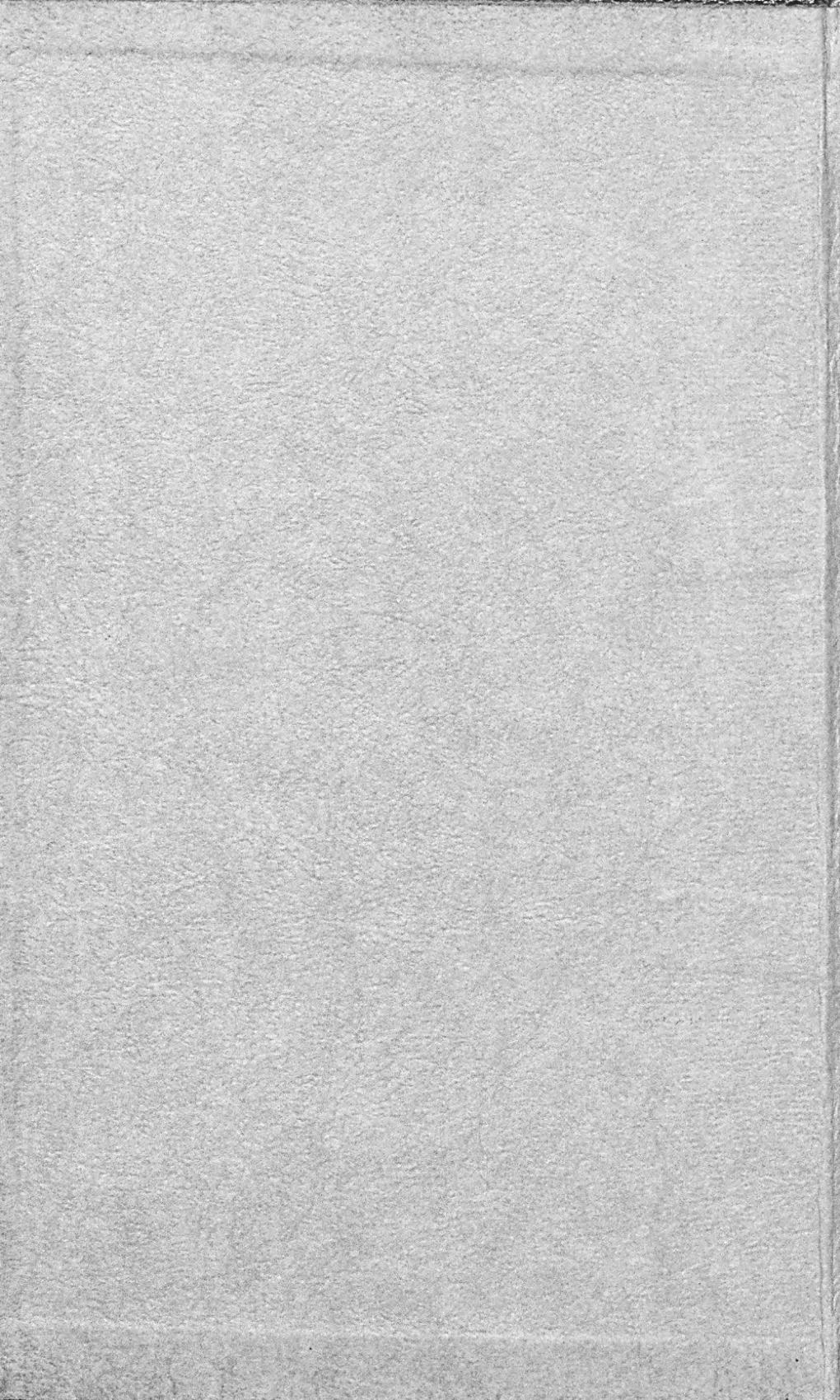


SOUTH AUSTRALIAN  
MOLLUSCS





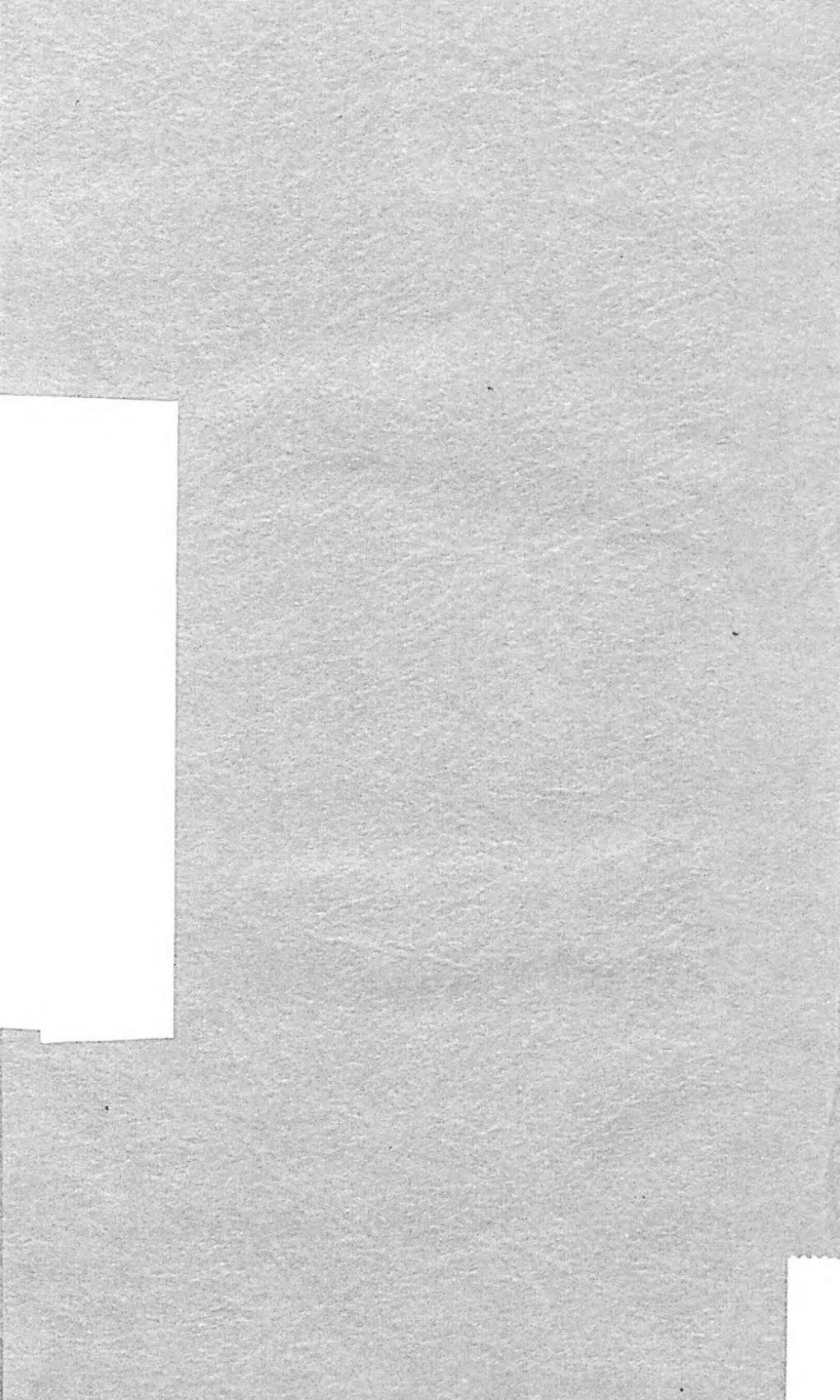
59-00044  
V61

ROYAL SOCIETY OF SOUTH AUSTRALIA. The following items, from "Trans.  
of the Roy. Soc. S.A.", all cr. 4to, wrappers, name on covers:

61. VERCO (Jos. C.) SOUTH AUSTRALIAN MOLLUSCS. A collection of  
papers bound together; cloth, ink notations & corrections throughout,  
picture adhered to upper endpaper, 1895-1918:  
a) Descriptions of new species of marine mollusca of S.A., Pp. 85-  
107, 3 plates, 1895;  
b) Descriptions ... pp. 218-232, 3 plates, 1896;  
c) Notes on S.A. Marine Mollusca with descriptions of new species.  
Parts 1-XII (separate pagination to each part), 28 plates, 1904-10;  
d) The Brachipods of S.A., pp. 89-99, 2 plates, 1910;  
e) Notes ... part XIII pp. 115-145, 2 plates, 1910;  
f) Western Aust. Polyplacophora by W.G.Torr, Pp. 94-107, 1911;  
g) Notes ... Part CIV, pp. 204-219, 4 plates, 1911;  
h) S.A. Polyplacophora by W.G. Torr, pp. 140-170, 3 plates, 1912;  
i) Notes ... Parts XV & XVI, 5 col, 2 b/w. plates, 1912-1918;  
j) Separate issue Notes ... Pts. X, XI, XII, Pp. 270-342, 10  
plates, 1909.

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May 1895.

DESCRIPTIONS OF NEW SPECIES OF MARINE  
MOLLUSCA OF SOUTH AUSTRALIA.

By Jos. C. VERCO, M.D., Lond., &c.

[From the Transactions of the Royal Society of South Australia, 1895.]

*Pterygnoteus* [Read May 7, 1895.]

*Murex Tatei*, spec. nov. Pl. ii., fig. 2, 2a, 2b.

539

Shell squarely pyriform, light, porous. Spire less than one-third the length of the shell. Nucleus conspicuous, papillate, one turn and a half, smooth, deep purplish-black, suture somewhat channelled.

Spire-whorls four, convex, roundly shouldered at the upper part; varices not quite regularly disposed, some continuous with those on adjacent whorls others not, well marked, breadth rather greater than height, rounded and reflected slightly, most prominent above the shoulder. Regularly disposed spiral liræ; six on the penultimate, fewer on the posterior whorls, about as high and as wide as the interspaces. These are completely covered with very regular thin close-set erect longitudinal laminæ, very uniformly corrugated, so that between the liræ they are straight, and on the liræ are semicircular, with the convexity to the right. These semicircular corrugations are so uniform that their sides, which touch, seem to form thin spiral vertical plates with a longitudinal scalloping between, giving the shell an appearance of being covered with coral, or chain-stitch crochet work which is continuous over the varices.

Body-whorl ventricose, roundly angulated at upper part, nearly flat above this, sloping with slight convexity below, markedly contracted at midpoint between the suture and anterior extremity of canal. Varices five, about one to one and a-half lines wide and a line high, highest behind the shoulder. About 20 spiral liræ, alternately higher and lower, covered with the same crenulated longitudinal laminæ as the spire. Aperture obliquely oval, very slightly contracted anteriorly. Outer lip simple, finely crenulated, and lirate for a line within. Outside thickened to two lines by about nine superposed scallopings, corresponding with the crenulations of the lip. Inner lip distinct, on the arcuate columella, continuous behind with the outer lip, smooth, thin, inflected at the lower part of the aperture, so as to partly cover the canal. Canal slightly longer than the aperture, nearly straight, deflected first to the left, then straight, then to the left, almost closed; shortly and sharply recurved at the an-

terior extremity. Color greyish-white. Reddish-brown inside from suture to shoulder, indistinctly visible outside in the interstices of the crenulations. Operculum horny, nucleus apical, anterior.

Length, 15 mm.; breadth between the varices, 7.5—including them, 9.5. Length of aperture, 5; breadth, 3; of canal, 6; of spire, 4 mm. One broken shell has an aperture of 5.5 mm. long, and a canal of 8 mm.

No Murex known to me so resembles it as to require a diagnosis.

*Habitat*.—Backstairs Passage, S.A. Dredged in 20 fathoms, one alive; 17 fathoms, one alive immature; 22 fathoms, one recent; ? depth, seven dead, three recent (*J. C. Verco*).

Type specimen in my collection. I have named it after the well-known President of the Royal Society.

*Murex* (POROPTERON, *Jousseaume*, 1880) *robustus*, spec. nov. Pl. ii., figs. 3, 3a. *Pterynotus* 538

Shell ovate trigonal, solid, spire not quite so long as body whorl. Whorls six, exclusive of nucleus. Nucleus slightly papillate one and a-half turns, dextral. Spire-whorls subconvex, nearly smooth. Sutures distinct, simple. Varices three, regular, almost continuous, each just behind that on the previous whorl, and ending posteriorly in a sinuous, stout, roundly-trigonal tube, directed towards the apex of the shell. On the left side of the varices are short, stout, spiral buttresses, three on the penultimate, from the lower suture to the base of the tube behind. Body-whorl convex, scarcely shouldered above. Varices three, low and stout, ending close to the suture in a tube, trigonal in section, stout and sinuous, like a horn, extending backwards, hollow, rugose, and showing the scar of closure, just to the left of the anterior edge. Surface of whorl rather rugged, with five or six obsolete spiral liræ, and sublenticular very fine, incised, longitudinal growth-lines. Aperture oval, slightly oblique, small, entire; peristome projecting as a thin, detached, simple, sharp lamina, from  $\frac{1}{4}$  to  $\frac{1}{2}$  mm. On the outside of the outer lip are six rounded, tubular, spiral ribs, extending to the margin of the varix (forming the "buttresses" of the varices on the spire); the most anterior is very short, and ends in the scar of the canal. Columella invisible. Canal completely closed; length just longer than the aperture; at its anterior end bent at a right angle, and then curved slightly to the right, with a capillary opening from a little behind the bend to the extremity, numerous fine, incised, longitudinal sinuous lines on its basal aspect. Labial varix saw-like, with nine forward-curved, claw-like processes; the central ones terminate the obsolete spiral liræ of the whorl, and from

their under surfaces give off five of the buttresses of the apertural lamina. About five small tubercles continue the series posteriorly on the proximal part of the variceal tube. Operculum horny, ovate, nucleus apical anterior. Ornament, in very young specimens, a chestnut-brown spiral line at the base of the variceal tube, and a second about the level of the lower end of the aperture.

Length, 14.25; breadth, 5.5 between the varices, 7 including them; spire, 6; body-whorl, 8.25; length of aperture, 3; width, 2; length of canal, 3.75 mm.

*Habitat*.—Backstairs Passage, 22 fathoms, three alive, and St. Vincent's Gulf, dredge siftings, ? depth or exact locality, 25 dead and alive of various sizes (*J. C. Verco*).

Type specimen in my collection.

It bears a superficial resemblance to *M. Angasi*, Crosse, but this is a narrower thinner shell, with a single curved (not sinuous) and open posterior variceal hook, an open anterior canal, and a simple aperture.

This shell resembles a *Typhis* in its sinuous posterior tube; but the variceal origin of the tube separates it from all the species of that genus, in which the canal is inter-variceal.

It differs from *T. triangularis*, A. Ads., in the absence of spiral liræ, and the closed straight canal. From *T. Japonicus*, A. Ads., = *T. arcuatus*, Hinds., in having no arched varices, no pseudo-varices, and its tubes not truncated. From *T. cancellatus*, Sow., in the very narrow varices along the canal.

*Litozamia* **Trophon angustus**, sp. nov. Pl. i., fig. 6, 6a. *569*

Shell fusiform, sordid-white, lamelloseously varicose; whorls six or seven, including the nucleus. Nucleus one turn and a-half, smooth, polished, blunt. Spire subturreted, whorls moderately convex, varices slightly higher than wide, six in each whorl; two or three broad obsolete spiral liræ, most marked just beyond the varices. Body-whorl slightly convex, contracted somewhat anteriorly; about five broad subraised spiral liræ, with two to five intervariceal longitudinal liræ, dividing the intervariceal areas into square spaces of varying size. Varices six, sinuous, posteriorly shortly convex to the right, straight in the middle, anteriorly openly and markedly concave to the right, in apposition over the dorsum of the canal; the last-formed rather higher than wide, but easily worn down; so that the earlier ones are wider than high, higher and narrower anteriorly. Aperture elongate-ovate, enamelled internally; outer lip varicose; columella arcuate, distinctly angled at junction with canal; inner lip thin, anteriorly slightly separate from columella, and very slightly curving over the canal; canal bent to the left,

moderately open, reflected, and notched. The shell has an inner hard enamel-like layer, and an outer of soft, porous, chalky consistence. This when perfect is nearly smooth, longitudinal and transverse markings being scarcely visible. When slightly denuded coarse and fine longitudinal lines become evident; when more denuded those are less marked and spiral ones are more manifest, numerous spiral incisions running along the broad liræ; and when the enamel only remains there are four or five subraised principal spiral liræ, with abundant fine interstitial striæ, but no longitudinal intervariceal markings.

Length, 10 mm.; breadth, including varices, 4·25 mm.; length of spire, 5; of aperture, 2·5; breadth, 1·5.

*Habitat*.—St. Vincent Gulf; dredged in deep water, three individuals (*J. C. Verco*).

Type specimen in my collection.

From *T. Goldsteini*, Ten.-Woods, it is more slender (*T. Goldsteini* is 11·5 to 6, with the outer covering intact); varices are more arcuate and more approximate; whorls less angulate, less ventricose.

*Emozenia Trophen levis*, sp. nov. Pl. ii., fig. 5, 5a. 581

Oblliquely ovate-fusiform, thin, sordid-white. Whorls seven. Nucleus indistinct, one turn and a half, slightly eccentric. Spire elevated, acute, shorter than last whorl, as 12·25 to 17·5. Whorls nearly flat, sloping, obtusely angulated at lower third, sutures indistinct, shoulder with distant tubercles vanishing about middle of penultimate whorl, most marked at its commencement. Body-whorl subventricose, uniformly rounded, somewhat constricted at the base; nine low, broad, rather rude longitudinal costations at irregular distances; obsolete broad flat spiral elevations, broadest and lowest about the periphery, narrower and more valid anteriorly, where also longitudinal incremental striæ are most marked; suture moderately distinct, irregular, crenulated in places by the ends of obsolete incremental lines. Aperture elongately oval, contracted posteriorly, opening widely into the canal in front; outer lip simple, thin, with wide shallow crenulations corresponding with the spiral liræ. Columella smooth, arcuate, slightly excavated; callus thin, spreading a little over the base, especially behind. Umbilicus rimate. Canal short, widely open, sub-sinistral, scarcely recurved, hardly notched. There is a complete, thin, soft chalky coating which smears and obscures the sculpture, but is evidently not an adventitious deposit. Three dark blackish-purple bands about a line in width visible inside the outer lip, in the posterior half of the aperture, the lowest one at its middle; two more, indistinct, at the junction with the canal, and two narrow and scarcely visible behind these. They lie between the spiral liræ. Operculum muricoid. Dentition, pl. iii., fig. 3, muricoid.

Length, 27.5 mm.; greatest breadth, 16 mm.; length of aperture and canal, 17.5 mm.; greatest width, 7 mm.

*Habitat*.—Backstairs Passage, S.A. Dredged alive in 22 fathoms; one example in my collection.

From *T. Flindersi* it differs by being much thinner, narrower, spire more acute, whorls less angulated, outer lip thin, not denticulated, columella not so excavated, umbilicus smaller, canal more open; surface much less sculptured. *T. Flindersi* is a littoral shell. *T. levii* was dredged in deep water. It is possibly only an extreme variety resulting from its very different station.

*Gondwanella fratercula*

*Triton mimeticus*, Tate (Sipho?). Pl. 2, figs. 4, 4a.

5713

In the Proc. Roy. Soc. of S.A. for June, 1893, p. 189, Prof Tate described a shell which he referred provisionally to *Sipho*, recognising it as probably immature, and as needing further material to determine its generic location. This material has been furnished by two more specimens dredged by me in Investigator's Straits, one of which is slightly less immature than the type, and the other has formed two varices, and so established its position as a *Triton*. It is an interesting form in two respects, viz., the comparative length of its canal, and the delay in forming its first varix until about four and a-half whorls have been completed. I have given below a full description of the shell.

Shell ovately-fusiform, imperforate, rather thin. Whorls nearly six. Spire moderately elevated, one-third the length of the shell, as 7 to 21; whorls 5, including nucleus. Nucleus one turn and a-half, slightly oblique, apex nearly flat and forming a sharp angle with the short steep side in the first turn; second turn subconvex. Spire-whorls, the first slightly and medially angulated, the second with a marked shoulder at first median, but gradually approaching the suture, which it reaches about the middle of the third spire-whorl and runs in apposition with it for the third of a revolution, when the first varix is formed, and the suture sinks again to reascend just before the next varix is produced. Suture distinct. Whorls subconcave behind the shoulder, with spiral liræ, increasing in number with the size of the shell, about six in the penultimate and two interstitial threadlets; liræ rounded, narrow, about half the width of the interspaces; longitudinal growth-lines at unequal intervals, making the spiral liræ somewhat moniliform; obsolete longitudinal costæ, most marked at the angle, where they produce a row of tubercles, 15 on the penultimate whorl. Body-whorl large, angulation well-marked, with less pronounced carina in front, so as to divide the whorl into three equal parts; concave behind the angulation, flat and sloping to carina, excavated

anterior to this. Seven well-marked, acute, rounded tubercles on the shoulder on the dorsal aspect, none on the ventral, present but much less valid on the carina. Spiral liræ eleven behind the angle, eleven to carina, and 22 to end of canal; sublenticular growth-lines, no longitudinal costæ; ventral surface very flatly convex, shoulder obsolete, carina absent, no tubercles, liræ faint. Aperture obliquely oval, sharply marked off from the canal; columella arcuate, inner lip thin, distinct, joining outer lip behind, and forming a minute sinus with it by means of a small tooth-like spiral callus. Outer lip thickened by an ascending external varix, bevelled inside to a sharp margin, seven or eight teeth internally, the anterior three or four doubled.

Length of aperture, 8.5 mm.; breadth, 6.5 mm.; canal, 5.5 mm., almost closed, curved obliquely to the left, slightly recurved. Ornament, irregular rusty blotches, with articulated rusty spots on carina. Total length, 21 mm.; breadth, 11.25.

*Habitat*.—Dredged, Tapley's Shoal, 12-16 fathoms. One, immature, dead (*Mr. Matthews*). Investigator's Straits, 15 fathoms, one dead; 20 fathoms, one immature, dead (*Verco*).

From *T. Bassi* it differs by spire more acute, nucleus much smaller, more acute and angled, varix later formed (in *T. Bassi* after three or three and a-half turns), whorls more angled, and tuberculate, canal longer.

changed 1914 *Actinovacum flindersi* Verco 1914  
1895 *Latirus aurantiacus*, sp. nov. Pl. II, fig. 1, Ia. 1914

Shell ovate-fusiform, very solid. Spire elevated, shorter than the aperture. Whorls six, without the nucleus which is wanting; rather convex, roundly angled just below the middle, and provided with eight or nine rounded well-marked nodules, about equal in width to the intervals, and costate in the lower half of the whorls. Spiral liræ eight to ten, distinct, varying in size, devious, about equal in width to the interstices, and crossed by longitudinal rather distant scabrous lines of growth. Suture distinctly marginate, sinuous, ascending between the costæ, edge crinkled by imbricating growth lines. First and second whorls nearly destroyed by fine borings. Last whorl subventricose, shouldered at six lines from the suture, very slightly concave above, convex below, narrowing rapidly to its minimum at the middle point of the ventral surface; with nine very valid longitudinal costæ, flatly rounded, rather wider than the interspaces, highest at the shoulder, which abruptly points them, very slightly marked above the shoulder, gradually narrowing and subsiding below, to disappear at the middle of the base. Well-marked spiral liræ sub-equidistant (16 in the whorl), with an occasional spiral thread between the more distant (four in the whorl). Above the shoulder the liræ, five in number, are narrowest;

below it they gradually increase in size anteriorly, rounded, not quite as wide as the interstices. Whole surface roughened by close-set (two to the line) sub-vertical, imbricating, crinkled, incremental laminae. Suture rather widely margined, sinuous, generally ascending between the costæ, conspicuously crinkled by longitudinal laminae. Umbilicus small, partly covered by the inner lip, which is somewhat reflected into it, left margin slightly corrugated by varix of the notch. Columella nearly straight in its lower half; three distinct equal plaits, slightly oblique, the lowest corresponding with the prolongation backwards of the varix of the apertural notch. Aperture obliquely ovate, an inconspicuous narrow ascending posterior sinus formed by the marginate suture. Canal about one-third of the whole aperture, open, wide, slightly deviated to the left, notched anteriorly, very slightly recurved. Outer lip acute, thin, a little everted, due to incipient formation of a costa, crenated by the spiral liræ of the whorl, which also form sulcations within; internally of a deep salmon color at the margin, fading into the polished bluish white throat, and with somewhat darker red lines in the lirate depressions. Inner lip thin, a little spread over the columella, and partially occluding the umbilicus, of a glistening pearly-white color with a rusty tinge, especially between the plaits and near the upper part of the aperture. Ornament, a rusty salmon color most marked near the margin of the aperture, nearly hidden elsewhere by some green adventitious deposit. Operculum ovate, acute, nucleus at anterior apex.

Length, 46 mm.; greatest breadth, 27 mm.; length of aperture, 27 mm.; width, 10 mm.; of spire, 19-20 mm.

*Habitat*.—Backstairs Passage, S.A.; 18½ fathoms, dredged alive, one individual in my collection.

The shell most allied appears to be *L. concentricus*, Rve. My shell is not so thick, the costæ and liræ are more numerous and not so valid; the last whorl is longer relatively to the spire.

### Dolicholathyreus

*Latirus Pulleinei*, spec. nov. Pl. i., fig. 1a, 1b.

64 *Gaster*

*Pulina*  
*Publica*

*Fons A.*

Shell elongately-fusiform, moderately thick. Whorls eight; nucleus absent from all the specimens (eight). Spire elongated, whorls regularly convex, with spiral liræ (on the penultimate six primary, and four smaller intermediate in the anterior part), acute, about one-third as wide as the interspaces, crossing over inconspicuous longitudinal rounded costellæ (15 on penultimate whorl), as wide as the intervals. Sublenticular longitudinal incremental striae not crossing the liræ. Suture distinct, slightly marginate. Last whorl regularly convex, with about 22 acute spiral liræ, and eight interstitial striae gradually becoming stouter anteriorly until they are as valid as the liræ; obsolete

longitudinal curved costellæ above the periphery, becoming gradually less conspicuous until they disappear, remaining longest close to the suture; near the aperture in a large example they reappear. Aperture obliquely-elongately-oval, descending into the canal, pinched into a tiny furrow posteriorly by the marginate suture. Outer lip simple, slightly sinuous, thin, finely crenated, obsoletely lirate internally. Columella subarcuate, sub-convex at the beginning of the canal; only a trace of callus, except anterior to the varix of the notch where it is subconcavely reflected, and forms a minute rimate umbilicus. The spiral liræ are almost quite obliterated at the inner lip, and three sub-raised thread-like plicæ are visible deeper in the throat, equal and equi-distant, and with the same obliquity as the spiral liræ, the highest at the centre of the aperture; sometimes a fourth exists close below them. Canal nearly as long as the aperture, sub-concave lengthwise along its left border, in the same sinistral oblique line as the aperture, wide, open, scarcely notched. Ornament, curved longitudinal rust-brown streaks on the summit of the costæ, sometimes broken into dots on the spiral liræ; at irregular distances on the body-whorl, and slightly sigmoid; crowded into a rusty area on the varix of the notch.

Total length, 51.5 mm.; greatest diameter, 19.5; length of aperture, 15.5; width, 6.5; length of canal, 11 mm. The relative lengths of the last whorl (including aperture and canal) and the spire vary slightly in individuals of the same size, and as the shell grows, the spire, which is at first shorter than the last whorl, becomes longer than it, as shown in the following series:—

Spire	7.75,	whorl	9.75,	as	79.5	to	100.
"	11.75,	"	14.25,	"	82.4	"	
"	13.5,	"	16,	"	84.4	"	
"	19,	"	22.25,	"	85.4	"	
"	28,	"	26.25,	"	106.9	"	

*L. Walkeri* of J. C. Melville, Proc. Malac. Soc. Lond., 1895, vol. I., No. 5, p. 221, pl. xiv., fig. 9, from Cossack, W. Australia, approaches it, but that shell is smaller, length 25 mm., more solid, costæ about half as numerous and more valid, suture not marginate, aperture with a distinct continuous inner lip, a thick everted or bevelled outer lip, and a more abrupt origin of the canal from the aperture. The above diagnosis is constructed from his plate and rather short description.

*Habitat*.—Eyre's Sand-patch, West Australia, many dead, Mr. Pulleine (after whom the shell is named), and Verco; Largs Bay, St. Vincent's Gulf (*D. J. Adcock*); subfossil, dredgings from Port Adelaide (*Dr. Perks*).

Bivalvia  
no FIG 168

*Crassatella producta*, sp. nov. Pl. i, fig 2.

Shell compressed, solid, ovately-trapezoidal, equivalvular, inequilateral. Umbos conspicuous, acute, apposed, very slightly retroflexed. Post-dorsal margin gently sloping, concave for one-fifth of its length next to the umbo, then almost straight; front dorsal margin scarcely convex, rapidly descending. Ventral margin nearly parallel with the post-dorsal, slightly approximating behind, uniformly subconvex, regularly rapidly curving upwards to form an almost circular anterior extremity; slightly ascending to join at a rounded angle the posterior margin. This is straightly truncated, nearly as long as the post-dorsal line in young specimens, about three-fourths in old ones, joining it at an obtuse angle of about  $120^{\circ}$ . Lunule long linear-lanceolate, smooth bevelled edges; right valve slightly including left; escutcheon, from the umbo almost the whole length of the post-dorsal margin, lanceolate, twice as wide as lunule, concave sides, sublenticular longitudinal striae, left valve slightly overlapping the right. Well-marked post umbonal ridge to postero-ventral angle; surface flat behind it, subconvex elsewhere; markedly concentrically sulcated, seven ridges in the last five lines from the ventral margin, stout, acutely rounded, smooth (but for few microscopic incised lines, especially on their ventral sides), about equal in width to the interstices, which contain from one to three threadlets; straight behind the umbonal ridge and nearly parallel with the margin of the truncated posterior end, but with the angle at the ridge more open and rounded in the earlier ridges. Internally: right valve, triangular cartilage pit behind a single narrow triangular tooth, with a shallow triangular notch in it; lateral teeth, anteriorly a long linear furrow, the inner plate slightly triangularly projecting anteriorly, posteriorly the base of the escutcheon scarcely projecting and sharp; left valve, two cardinal teeth, diverging, anterior triangular stout and prominent with a long shallow triangular groove, posterior thin and lamellar; lateral teeth, anteriorly base of lunule slightly projecting and sharp, posteriorly a long linear furrow, inner plate slightly triangularly projecting at the posterior part. Ventral margin finely denticulated about half a line within the extreme edge, more minutely towards front lateral tooth, posterior truncated margin smooth. Ornament, light terra-cotta outside, deeper colored at the umbo, some specimens with many pink radiating lines of varying width from umbo to margin, and growing wider; some individuals pure white. Internally smooth, shining, white to deep flesh tint.

Dimensions, antero-post diameter, 10.25 mm.; umbo-ventral, 7.75; post-dorsal margin, 5.75; posterior, 3.5; depth of closed valves, 3.25.

*Habitat.*—Backstairs Passage, off Hog Bay, 16 to 18 fathoms three valves; 20 fathoms, 17 valves; 22 fathoms, one alive, five valves; depth not noted, seven alive, 295 valves (*Verco.*)

Type specimens in my collection.

*Crassatella mica*, sp. nov. Pl. i., fig. 3.

*Bivalve*  
E 69

Shell trigonally orbicular, rather compressed, equivalvular subequilateral, solid. Umbos acute, apposed, anteflected. Post-dorsal margin very short, at first convex, then almost straight, very rapidly descending; front dorsal margin minutely excavated close to the umbo, then rapidly descending, almost straight; the two margins form rather more than a right angle with each other. Ventral margin acute, uniformly convex, about a quadrant, ascending roundly into the posterior margin, and rather more narrowly into the anterior. Lunule rather large, elongate-ovate, somewhat indistinct, left valve slightly overlaps the right. Escutcheon linear-lanceolate, edges rounded, right valve includes the left. Surface flatly convex, deeply concentrically sulcated, seven ridges in the last three lines from the ventral margin, smooth, flatly-rounded, rather wider than the interstices, and not quite so high as wide. Internally, right valve, triangular cartilage pit behind a well-marked, triangular, cardinal tooth, in front of this is a short, vertical diverging tooth-like plate, in which ends the inner lamina of the anterior lateral tooth socket; anteriorly is a linear groove, most marked at its front end, where the inner lamina projects slightly; the post-dorsal margin lightly projects in a tooth-like lamina; left valve, triangular cartilage pit, behind two diverging cardinal teeth, the anterior of which is the more oblique, prominent and stout; base of lunule slightly prominent to form an anterior lateral laminar tooth; posteriorly a long linear groove, with barely visible projection of inner lamina beyond the level of the outer; inner margin not denticulated. Color light-horn tint, some specimens white with horn-tint about the umbo.

Dimensions, anterior-post diameter, 6 mm.; umbo-ventral, 5.5; depth of closed valves, 2.5 mm.

*Habitat.*—Backstairs Passage, St. Vincent Gulf, S.A.; dredged 20 fathoms, one alive; 22 fathoms, one alive; dredge siftings, depth not noted, probably about the same, six alive, 184 valves (*Verco.*). Type in my collection.

*C. fulvida*, Angas, from Port Jackson, is allied, but is a transversely oval shell, being more produced anteriorly, much thinner and with proportionally fewer and stouter concentric ridges.

## EXPLANATION OF PLATES.

## PLATE I.

- Fig.*
- 1, 1a. *Latirus Pulleinei*, *Verco*; 1b. Details of sculpture.
  2. *Crassatella producta*, *Verco*.
  3. *Crassatella micra*, *Verco*.
  - 4, 4a. *Trophon Goldsteini*, *Ten.-Woods*.
  - 4b. Without its external coating, showing well-marked color bands.
  - 5, 5a. *Trophon angustus*, *Verco*.

## PLATE II.

- 1, 1a, 1b. *Latirus aurantiacus*, *Verco*.
- 2, 2a. *Murex Tatei*, *Verco*.
- 2b. Details of sculpture.
- 3, 3a. *Murex robustus*, *Verco*.
- 4, 4a. *Triton mimeticus*, *Tate*.
- 5, 5a. *Trophon levis*, *Verco*.
6. *Typhis Yatesi*, *Crosse*.

## PLATE III.

1. Radula of *Trophon Flindersi*, *Ads.*, and *Ang.*
  2. Radula of *Trophon Assisi*, *Ten.-Woods*.
  3. Radula of *Trophon levis*, *Verco*.
  4. Radula of *Fusus australis*, *Quoy*.
  5. Radula of *Fusus pyrulatus*, *Reeve*.
  6. Radula of *Fusus Dunkeri*, *Jonas*.
  7. Radula of *Fusus Lincolensis*, *Crosse*.
  8. Radula of *Fasciolaria coronata*, *Lam.*
  9. Radula of *Siphonalia dilatata*, *Quoy*.
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A REVISION OF THE RECENT GASTEROPODS OF  
SOUTH AUSTRALIA.

## PART I.

By JOS. C. VERCO, M.D., Lond., F.R.C.S., Eng., &c.

[Read May 7, 1895.]

It is proposed in the present paper to enumirate in order the species of the Families Muricidae, Tritonidae, and Fusidae, as a contribution towards a complete catalogue of the recent gasteropods of the Province of South Australia. Several circumstances have of late favored such an effort. (1.) The issue by Mr. D. J. Adcock in 1893 of "A List of Species of Aquatic Mollusca of South Australia," which provided local collectors with as accurate a catalogue of our shells as was then available. It has proved of considerable value, by enabling each conchologist to discover roughly what species he possessed not included among our known fauna. (2.) The formation of the Malacological Section of the

Royal Society. At its monthly meetings the species named in the above list have been critically discussed seriatim with the aid of specimens from the cabinets of its several members, and my thanks are here heartily tendered to the Section for permission in this paper to use the material which has been so carefully collated by its Honorary Secretary, Mr. R. H. Pulleine. (3.) Dredgings in the deeper waters of St. Vincent and Spencer Gulfs, which have been undertaken during the last five or six years, have supplied many new and interesting forms, as well as living or recent specimens, in considerable numbers, of species previously described. (4.) The examination of the odontophore from several of these molluscs.

The following plan will be pursued, as far as the material and literature at our disposal will permit. The name of each species in our waters will be given with a reference to the work in which it was described, that name being chosen which has priority in point of time. Synonyms, with their references, will be enumerated. The places where it is found in South Australia will be given, with the depth in fathoms, when known. Any information beyond that contained in the original description will be added.

If readers notice any omissions or inaccuracies, and will intimate the same to the writer of this article, he will be pleased to acknowledge them with thanks, and will endeavor to incorporate them in subsequent communications to the Society's Proceedings.

#### FAMILY MURICIDÆ.

##### GENUS MUREX.

*Stereomurex* 1. *M. triformis*, Reeve. 536

Reference.—Proc. Zool. Soc., 1845, p. 87. Conch. Icon. sp. 53.

Habitat.—Common throughout the whole coastline of South Australia. Also King George Sound, W.A., Victoria, and Tasmania, where, however, the specimens are much smaller. Most abundant, alive, in water from 5 to 10 fathoms, but it is found at all depths up to 22 fathoms (*J. C. Verco*).

6 *Typhosus* 2. ~~M.~~ *Angasi*, Crosse. 537

Reference.—*Typhis Angasi*, Jour. de Conch., 1863, vol. XI., p. 86, t. 1, fig. 2.

Type specimen from Port Jackson, N.S.W.

Syn.—*M. eos*, Hutton, New Zealand. Tryon Man. of Conch., vol. II., p. 88. *M. zonatus*, Ten.-Woods, Proc. Roy. Soc. Tasm., 1876, p. 132.

Habitat.—Encounter Bay, Spencer Gulf, St. Vincent Gulf, Investigator Straits.

Dredged alive, 13 fathoms, 1 ; 15 fathoms, 1 ; 17 fathoms, 2.  
Dead from 13 to 22 fathoms (*J. C. Verco*), Tasmania.

*Neurexus* 3. *M. umbilicatus*, Ten.-Woods. (*Trophon umbilicatus*). *560*

Ref.—Papers and Proceedings of the Royal Society of Tasmania, 1875-76, p. 135.

Syn.—*M. scalaris*, A. Adams (*non Brocchi*), Proc. Zool. Soc., 1853, p. 71.

Tryon in his Man. vol. II., p. 155, has placed it in *Urosalpinx*, which he defines as having a purpuroid operculum. But this species has a muricoid operculum, and belongs to the genus *Murex*. It was formerly confounded with *M. octogonus*, Quoy, Voy. de L'Astrol., 531, t. 36, figs. 8, 9.

Type specimen from the E. coast of Tasmania, uncommon.

Hab.—Spencer Gulf, St. Vincent Gulf, Backstairs Passage, Encounter Bay.

Dredged alive, 8 fathoms, 1 ; 12 fathoms, 2 ; 13 fathoms, 1 ; 14 fathoms, 2 ; 17 fathoms, 1 ; 19 fathoms, 2 (*J. C. Verco*).

*Neurexus* 4. *M. Brazieri*, Angas. *561*

Ref.—Proc. Zool. Soc., 1877, p. 171, pl. 26.

This was formerly confounded with *M. polypleurus*, Brazier.

According to Angas, it is somewhat allied to *M. mundus*, Reeve; and according to Brazier, in Proc. Linn. Soc., N.S.W., vol. VIII., pt. I., *Trophon tumidus*, Petterd, is a synonym.

Hab.—Spencer and St. Vincent Gulfs, Investigator Straits, and Backstairs Passage (*J. C. Verco*), Encounter Bay (*D. J. Adcock*).

Type specimen, Port Jackson Heads, 20 fathoms. Dredged alive, 17 fathoms, 1. Dead at 17, 19, and 22 fathoms, several. Many alive and dead in deep-water dredge-siftings (*J. C. Verco*).

5. *M. serotinus*, A. Adams.

Ref.—Proc. Zool. Soc., 1851, p. 268.

Syn.—*M. Blainvillei*, Payr., a Mediterranean form, according to Sowerby.

Hab.—One spec men, obtained alive, amongst the rocks at low water, spring tides, Aldinga Bay (*Angas*).

No other collectors have taken it in Australia.

6. *M. polypleurus*, Brazier. *not known*

Ref.—Proc. Linn. Soc., N.S.W., vol. VIII., 1894, part II., p. 179.

This was formerly known here as *M. pumilus* of A. Adams, but proves to be quite a distinct shell. Brazier refers it to the subgenus *Pseudo-Murex*, Monteserato, 1872.

Hab.—Several alive and dead in deep water in Spencer and St. Vincent Gulfs, depth not measured (*J. C. Verco*).

*Stereomastus*7. *M. Tatei, Verco.**Ref.*—*Antea*, p. 84.*Hab.*—Backstairs Passage, S.A. Dredged alive in deep water (*J. C. Verco*).8. *M. robustus, Verco.*

538

*Ref.*—*Antea*, p. 85.*Hab.*—Investigators Straits; deep water, several alive and dead (*J. C. Verco*).

## GENUS TYPHIS.

T. *Yatesi, Crosse.*

563

*Ref.*—*Jour. de Conch.* XIII., 1865, p. 54, pl. ii., fig. 3.

Type specimen, St. Vincent Gulf, S.A.

*Hab.*—Backstairs Passage, Spencer and St. Vincent Gulfs.Dredged 15 fathoms, 1 alive; 17 fathoms, 1 alive; 22 fathoms, 1 dead. Several alive and dead in deep water (*J. C. Verco*). Pl. ii., fig. 6.

In living specimens which measure 12 mm. from the end of the spire to the end of the varix anteriorly whence the anterior tube springs, this is 6 mm. in length, and the posterior tube 9 mm. I have an individual which, including the whole length of the shell and anterior tube, would total 25 mm. Crosse's specimen was 14 mm. total length.

## GENUS TROPHON.

*Litozamia*<sup>1</sup> ~~T.~~ *Goldsteini, Ten.-Woods.**Ref.*—*Proc. Roy. Soc., Tasmania*, 1875, p. 136.

Type, Long Bay, Tasmania.

564

Several South Australian specimens compared with individuals from Tasmania, kindly lent by Miss Lodder, prove to be identical. Some, however, almost constitute a variety, being smaller, and with far less prominent spiral liræ. The shell in life is composed of two distinct layers, an inner enamel-like foundation and an outer sordid white, loose textured, soft chalk-like coating. In perfect specimens this is smooth, but when very slightly worn it shows numerous spiral and longitudinal fibres or incisions. In beach-rolled specimens this is nearly or entirely removed, leaving only the hard shining enamel-like basis, which shows numerous spiral threadlets besides the few sub-raised spiral liræ.

*Hab.*—Middleton and Rivoli Bay (*D. J. Adcock*), Streaky Bay Pondolowie Bay (*J. C. Verco*). Dredged Spencer Gulf, 9 fathoms, 1; depth probably 15 fathoms, 4 alive, 1 dead; 10 fathoms, 1 dead; Backstairs Passage, 22 fathoms, 1 dead; Investigators Straits, 20 fathoms, 1 dead (*J. C. Verco*).

*Litoyania* 2. *T. angustus*, Verco.Ref.—*Antea*, p. 86.Hab.—St. Vincent Gulf; dredged deep water, 2 alive, 1 dead  
(J. C. Verco).

569

*Bedeva* <sup>3.</sup> *T. Paivæ, Crosse.*

583

Ref.—*Jour. de Conch.*, Third Series, vol. XII., 1864, p. 278,  
pl. xi., fig. 7.Type specimen collected at low tide under stones on Yorke's  
Peninsula, S.A.Tryon classes it as a *Urosalpinx*, and regards *Fusus Hanleyi*,  
Angas, as an elate form (Man. of Conch., vol. II., p. 155). But  
it is not a *Urosalpinx*, and *Fusus Hanleyi*, Angas, is a different  
shell altogether. He says also "it is not readily distinguished  
from *U. Floridana*, Conrad. Von Martens considers *Fusus corti-  
catus*, Hutton, a synonym of *U. Paivæ*," loc. cit.Hab.—Dredged alive and dead, deep water St. Vincent Gulf  
(J. C. Verco), Encounter Bay (D. J. Adcock).*Benthocystus*. *T. recurvus*, Koch (Fusus).

573

Ref.—*Abbild. und Beschreib., Conch. Philippi*, vol. II., p. 119,  
tab. 3, fig. 6.This shell was separated as a species distinct from *T. Paivæ*,  
by Mr. W. T. Bednall, who was proposing to describe it as new,  
when its identity with the *Fusus recurvus* of Koch, of unknown  
habitat, was recognised.Hab.—St. Vincent Gulf, Salt Creek (W. T. Bednall), Sema-  
phone, alive (D. J. Adcock).*Bedeva* <sup>5.</sup> *T. Assisi, Ten.-Woods.*

582

Ref.—*Proc. Roy. Soc. Tasmania*, 1876, p. 132.

Type specimens, N. Coast, Tasmania (W. F. Petterd).

Tryon classes it as a *Urosalpinx*, and "doubts its distinctness  
from *U. Paivæ*, Crosse. It is probably a young shell," Man. of  
Conch., vol. II., p. 155.But it is not a *Urosalpinx*, for its operculum is ovate, with an  
apical nucleus. It is quite distinct from *T. Paivæ*; as T. Woods  
says, "it is easily distinguished by its long canal, and peculiar  
lamellose striations" (longitudinal, J. C. V.).It is not a young shell. Counting the number of its whorls,  
it is often older than *T. Paivæ*, and when full grown retains the  
same characters.It has been placed in Mr. Adcock's list as a *Peristernia*; but  
the absence of columellar plications, and the muricoid, and not  
fasciolaroid radula, which is figured on pl. iii., fig. 2, remove it  
from that genus.

Dredged. Yankalilla Bay, St. Vincent Gulf, 15 fathoms, in ooze, 2 alive, 8 dead; Spencer Gulf, 13 fathoms, 2 dead; 15 fathoms, 2 dead; Investigators Straits, 15 fathoms, 3 alive, 3 dead; 17 fathoms, 9 alive, 68 dead (*J. C. Verco*).

## *Benthoxystes*

6. *T. Petterdi*, *Brazier*.

572

*Ref.*—*Jour. Conchyl.*, third series, vol. X., 1870, p. 303, and vol. XI., 1871, p. 324, t. 12, fig. 2.

*Syn.*—*T. clathratus*, Woods, according to Von. Martens (*Zool. Rec.*, 152, 1875).

*Murex scalarinus*, A. Adams, is identical or allied, according to Tryon.

*Hab.*—Middleton Beach, very many (*D. J. Adcock*). Aldinga Beach (*J. C. Verco*). Dredged Spencer Gulf, deep water, many alive and dead (*J. C. Verco*). The Levens Beach, under stones, Tasmania (*Miss Lodder*).

My dredged specimens are identical with some forwarded by Miss M. Lodder from Tasmania. Mr. Adcock's, from Middleton, appear to be the same species, but have a blunter apex, and a shorter snout, probably because beach-worn; they are also slightly larger and stouter, perhaps because from a more exposed locality, and more manifest color bands. These bands are evidently variable in number; some have three, one just below the suture, a second in the centre of the last whorl, a third below the periphery, and winding round the base. Some have only the lower two, others only the lowest, and some are destitute of bands.

## *Litogamia* 7. *T. Brazieri*, *Ten.-Woods*.

568

*Ref.*—*Proc. Roy. Soc. Tasmania*, 1875, p. 136.

Type specimen, Tasmania.

*Hab.*—MacDonnell Bay (*D. J. Adcock*); Victoria.

## *Emozamia* 8. *T. Flindersi*, *Ad. & Ang. (Purpura)*.

580

*Ref.*—*Proc. Zool. Soc.*, 1863, p. 421.

Type from Yorke Peninsula, S.A.

The operculum is distinctly muricoid, and not purpuroid; and Tryon is right in transferring it to *Trophon* from *Purpura*. Woods suggests that *T. Flindersi*, *T. littorinoides* (Ten.-Woods), and *T. propinquua* (Ten.-Woods) may prove varieties only of the same species. The Malacological Section of the Roy. Soc. of S.A. are of opinion that the latter two are synonymous with *Ricinula Adelaideensis*; but *T. Flindersi*, is a distinct species.

*Hab.*—Along the whole coast of South Australia, on rocks from high to low tides.

Dentition, plate iii., fig. 1.

*Lemoyenaria* R. levis, Verco.

581

Ref.—*Antea*, p. 87.Hab.—Backstairs Passage, St. Vincent Gulf, South Australia,  
22 fathoms, dredged alive, one example (*J. C. Verco*).

## GENUS PURPURA.

*Neothais* 1. R. succincta, Martyn.

585 A

Ref.—Univ. Conch., II., pl. 45.

Tryon gives South Australia as the metropolis of this species (Man. of Conch., vol. II., p. 170), but the form figured by Martyn, having strong revolving ribs with excavated sides, is very rare on the South Australian coast. It would appear, however, that *P. textiliosa*, Lam. (Edit. Desh. 2, vol. X., p. 77), is only a variety of *P. succincta*, and this is a very common shell here. Tryon also affirms the identity of *P. agrota*, Reeve (Conch. Icon. 1846, sp. 42), with *P. mancinella*, Linn. (Syst. Nat. Edit. 12, 1,219), both of which are tuberculate forms. From a large number of specimens we have been able to obtain complete series of gradations between *P. succincta* and *P. textiliosa*, and between *P. textiliosa* and *P. agrota*, proving them all to be but variations of a common species. As *P. succincta*, Martyn, has priority of description, this is chosen as the name of the species, and the rest are regarded as varieties. This is satisfactory, too, inasmuch as a form closely resembling the typical shell is the first to appear palaeontologically in our Miocene strata (*teste, Tate*).

## 2. R. striata, Martyn (Buccinum striatum).

585 A

Ref.—Univ. Conch., t. 7; is also given by Tryon as a synonym for *P. succincta*.

It is unknown to local collectors, but included here on the authority of Brazier (P.L.S., N.S.W., vol. V., p. 481, 1881).

*Neothais* 3. R. Baileyana, Ten.-Woods.

589

Ref.—Proc. Roy. Soc., Victoria, 1880, p. 80.

Very rare in South Australia.

Hab.—Living on rocks, Guichen Bay (*Zietz*).

## GENUS RICINULA.

*Lepsiella* 1. R. Adelaidensis, Crosse.590 2  
572

Ref.—Jour. de Conch., 1865, vol. XIII., p. 50, t. 2, fig. 1.

Specimens of type and two varieties, *R. procerula* and *R. aurea*, from Port Adelaide and Gulf St. Vincent.The Malacological Section are of opinion that *Trophon littorinoides*, Ten.-Woods (Proc. Roy. Soc., Tasmania, 1875, p. 135), and *Trophon propinqua*, Ten.-Woods (Proc. Roy. Soc.,

Tasmania, 1876, p. 136), are identical, as suggested by Woods himself, and are synonyms of *R. Adelaidensis*; but quite distinct from *Trophon Flindersi*, of which Woods thought they might be varieties.

*Hab.*—Streaky Bay to Encounter Bay, on rocks below high-tide mark.

*Lepsiella* 2. *R. reticulata*, Quoy and Gaimard. 588

*Ref.*—Voy. de l'Ast., II., 566, t. 38, fig. 17, 18.

*Syn.*—*Purpura humilis*, Crosse and Fischer (Jour. de Conch., XIII., 1865, p. 51, t. 2, fig. 2); the type from St. Vincent Gulf.

Tryon regards these as young shells of the beaded form of *R. undata*, Chem. (Man. of Conch., vol. II., p. 189). This we are unable to determine.

*Dimensions.*—Crosse gives the dimensions as 12 mm. by 6 mm., but it often attains the magnitude of 18 mm. by 10 mm. Its station is quite different from that of *R. Adelaidensis*, which is a littoral shell; for it is dredged alive at 13 fathoms, 1; at 18 fathoms, 3; while larger specimens have been taken dead at 15 and 20 fathoms.

*Hab.*—Streaky Bay to Encounter Bay. Tasmania.

#### GENUS ADAMSIA.

*Lepsiella* A. *Adelaidæ*, Adams and Angas. 592

*Ref.*—Proc. Zool. Soc., 1863, p. 421, t. 37, fig. 2.

Type from Port Adelaide, S.A.

Tryon, in Man. of Conch., vol. II., p. 156, gives it as a variety of *Urosalpinx tritoniformis*, Blainville, which he says is identical with *Adamsia typica* of H. and A. Adams, and that *Purpura neglecta* of Adams and Angas is synonymous with *A. Adelaidæ*. Specimens of the first from N.W. Tasmania (*W. T. Bednall*) are, however, easily separable by their more elate form and much more numerous spiral liræ and scarcely visible incremental striae. *P. neglecta* from Port Jackson (*W. T. Bednall*) is also distinguishable as a smaller shell, more elate, and angulate and tuberculo-plicate, and has a closer affinity with *Ricinula reticulata*, Q. and G.

#### FAMILY TRITONIDÆ.

##### GENUS TRITON.

###### 1. *T. nodiferus*, Lam.

*Ref.*—Edit. Desh., IX., 624.

*Syn.*—*T. Sauliae*, Reeve, Proc. Zool. Soc., 1844, 112; Conch. Icon., 1844, fig. 17; and *T. australis*, Lam., Edit. Desh., IX., 625 (see Tryon Man., vol. III., p. 10).

One specimen in Adelaide Museum, found on Thistle Island, Spencer Gulf, by Mr. Zietz.

*Negropina* 2. *T. subdistortus*, Lam.

544

Ref.—Edit. Desh., IX., 638.

Hab.—St. Vincent and Spencer Gulfs; Encounter and Lacepede Bays (*D. J. Adcock*); Tasmania; Victoria.

Dredged alive, 10 fathoms, 4; 11 fathoms, 2; 12 fathoms, 1; 15 fathoms, 1, with many round yellow eggs attached separately to inside of deep valve of *Pecten fumatus*; 17 fathoms, 5; 22 fathoms, 1 (*J. C. Verco*).

*Yonanula* 3. *T. Bassi*, Angas.

542

Ref.—Zool. Proc., 1869, 45, t. 21, fig. 2.

Syn.—*T. fraterculus*, Dunker (Mal. Blatt., XVIII., 1871, 106).

Tryon, in his Man., vol. III., p. 11, says it is probably synonymous with *T. subdistortus*, but he could not have had the two shells for comparison; they are quite distinct.

Type from Corner Inlet, Bass Straits (*Brazier*).

Hab.—St. Vincent Gulf, Backstairs Passage, Investigators Straits (*J. C. Verco*), Encounter and Lacepede Bays (*D. J. Adcock*).

Dredged alive, 14 fathoms, 1 mature and 6 minute fry inside the valve of a *Cardium multicostatum*; 17 fathoms, 4 and 1 immature; 19 fathoms, 1 in dead shell and coral (*J. C. Verco*).

4. *T. mimeticus*, Tate (*Sipho?*).

Ref.—Trans. Roy. Soc. S.A., 1893, part I., p. 189, pl. i., fig. 10; also *Verco*, ante, p. 88, pl. ii., figs. 4, 4a.

Tapley's Shoal, 12-16 fathoms, 1 dead (*Matthews*); Investigator's Straits, 15 fathoms, 1 dead; 20 fathoms, 1 dead (*Verco*).

*Cymatilesta* 5. *T. Spengleri*, Lam.

538

Ref.—Edit. Desh., IX., p. 627.

Hab.—Middleton (*D. J. Adcock*), Port Lincoln (*Perks*), Cable Cove, Cape Spencer (*J. Matthews*).

*Cymatilesta* 6. *T. Waterhousei*, Adams & Angas.

538

Ref.—Zool. Proc., 1864, p. 35.

Type from Port Lincoln.

Hab.—From Streaky Bay to Encounter Bay (*Verco*), Port Jackson.

Dredged alive, 14 fathoms, 1; 16 fathoms, 1; 20 fathoms, 2; 22 fathoms, 1 (*Verco*).

7. *T. Barthelemyi*, Bernardi.

Ref.—Jour. de Conch., 1857, p. 55. Angas, Proc. Zool. Soc., 1865, p. 161.

"Evidently very closely allied to *T. Spengleri*, of which it will very probably prove to be an overgrown form" (Tryon Man., vol. III., p. 17).

This shell has not been taken or recognised by local collectors. Angas, *loc. cit.*, gives its station "amongst rocks at low tides. "Hab.—Cape Northumberland; Gippsland, Victoria."

He distinguishes it from *T. Spengleri*.

### *Cymatium* 8. *T. exaratum*, Reeve. 534

Ref.—Proc. Zool. Soc., 1844, p. 116; Conch. Icon., 1844, fig. 50.

Tryon (Man., vol. III., p. 23) suspects this to be identical with *T. gibbosus*, Brod.

Type from N. coast of Australia.

Hab.—Middleton and Kingston Beaches (*Adcock*).

### 9. *T. Quoyi*, Reeve.

Ref.—Conch. Icon., 1844, fig. 93.

Syn.—" *T. viperinum* of Kiener, not Lamark—the latter being a distinct fossil form" (Tryon, Man., vol. III., p. 24).

Hab.—Along whole coast-line of South Australia. Tasmania; Victoria.

Dredged alive at all depths from 5 to 30 fathoms, many (*Verco*).

### *Cymatiella* 10. *T. verrueosus*, Reeve. 544

Ref.—Proc. Zool. Soc., 1844, p. 118; Conch. Icon., 1844, fig. 71.

Hab.—Streaky Bay, Spencer Gulf (*Verco*), Aldinga and McDonnell Bay (*D. J. Adcock*).

### 11. *T. eburneus*, Reeve.

Ref.—Proc. Zool. Soc., 1844, p. 118; Conch. Icon., 1844, fig. 69.

Type from Isle of Ticao, Philippines.

Hab.—Wallaroo Bay (*Maughan*), Corny Point, Spencer Gulf (*Perks*), Pondolowie and McDonnell Bays (*Verco*). Dredged one recent in 22 fathoms, Backstairs Passage (*Verco*).

### *Ratifusus* 12. *Triton*—(*Epidromus*) *Bednalli*, Brazier. 553

Ref.—Proc. Linn. Soc. of N.S.W., 1875, p. 6.

Type from Guichen Bay, S.A. (*Bednall*).

It may be dark mahogany-brown, or quite white, or with narrow brown bands, or with two rows of small square spots on each spire-whorl, and four on the body-whorl.

Hab.—Corny Point, Spencer Gulf, very fine (*Perks*); Middleton (*D. J. Adcock*), Victoria; St. Vincent and Spencer Gulfs, dredged 16, 20, and 22 fathoms, 1 dead (*Verco*).

## GENUS RANELLA.

1. *R. leucostoma*, Lamarck.

*Ref.*—Edit. Desh., vol. IX., p. 542; Reeve, Conch. Icon., fig. 4; Coq. Viv. Mon., p. 29, pl. ix., fig. 1.

*Hab.*—Middleton (*D. J. Adcock*), Yorke Peninsula, St. Vincent Gulf (*Matthews*); Tasmania; New Zealand.

2. *R. argus*, Gmelin.

*Ref.*—Dieff., N.Z., p. 229; Reeve, Conch. Icon., fig. 13; Chenu, fig. 713.

*Syn.*—*R. ranelliformis*, King, Zool. Jour., vol. V., p. 347; *R. vexillum*, Sow., Zool. Proc., 1841, p. 51; *R. proditor*, Frauenfeld, Verh. Zool. Bot. Gesell., Wien, XV., 1865, 894; Velain, Archives Zool. Exp., VI., 100, t. 2, fig. 5; *R. tumida*, Dunker, Zool. Proc., 1862, 239.

Type form from Cape of Good Hope.

*Ref.*—One small example cast up Port Elliot (*Miss E. Stow*); New Zealand.

## GENUS FUSUS.

648

*Fusus* 1. *F. australis*, Quoy.

*Ref.*—Voy. de l'Ast., vol. II., p. 495, t. 24, figs. 9-14 (pl. xxxiv., according to Kiener in Coq. Viv. Mon. p. 25, pl. xii., fig. 1).

*Syn.*—*F. crebriliratus*, Rve., Conch. Icon., 1847, fig. 20; *F. marmoratus*, Phil., Abbild. & Besch., 1846, vol. II., p. 120, t. iii., fig. 7; *F. rudicostatus*, Sby., Thes. Conch., 1880, sp. 30, fig. 19; *F. laevigatus*, Sby., Thes. Conch., 1880, sp. 30, fig. 157; *F. nodocinctus*, A. Ads., Zool. Proc., 1855, p. 222; *F. aureus*, Rve., Conch. Icon., 1847, fig. 17; *F. caudatus*, Quoy, Voy. de l'Ast., vol. II., p. 503, t. 34, fig. 20, 21.

Its dentition is figured by me on pl. iii., fig. 4, and shows a small rachidian tooth, with three short denticles, and a long, curved, ten-tooth lateral.

*Hab.*—Spencer and St. Vincent Gulfs, Encounter Bay.

Dredged alive at all depths up to 23 fathoms (*Verco*).

2. *F. pyrulatus*, Reeve.

*Ref.*—Conch. Icon., 1847, t. 13, fig. 50a-50b.

"The type is from Tasmania, but it also occurs in Port Phillip Bay, and, according to Angas, in Spencer Gulf" (Tate, Trans. Roy. Soc. S.A., vol. XIV., p. 257).

Dredged alive in Hardwicke Bay, Spencer Gulf, many; Backstairs Passage, 15 fathoms, 1 small; 17 fathoms, 1 small. Investigator's Straits, 15 fathoms, 1 recent (*Verco*).

This shell, originally described by Reeve as a *Fusus*, and so

placed by Tryon (Man., vol. III., p. 60)—he had not seen the species—was named by Prof. Tate, *loc. cit.*, *Austrofusus pyrulatus*. A drawing of its dentition, given on pl. iii., fig. 5, shows a three-denticled rachidian and curved, saw-like laterals, and definitely withdraws it from *Siphonalia*, and makes it congeneric with *Fusus australis*.

### 3. *F. ustulatus*, Reeve.

*Ref.*—Conch. Icon., 1848, fig. 66.

This species was also classed by Prof. Tate, *loc. cit.*, as *Austrofusus*; but Tryon regards it as a *Fusus*. Although I have not yet been able to determine its dentition, yet from its conchological characters, there is little doubt it will prove to be a *Fusus*. Tate also makes it a synonym of *F. sulcatus*, Lam. (An. s. Vert., 1822, vol. VII., p. 125). Tryon, on the other hand, gives *F. sulcatus* of Lam., as a *Siphonalia*, and *F. ustulatus* of Reeve as a *Fusus*. There is little question they are distinct species. Although Tryon gives South Australia as the habitat of *F. sulcatus*, Lam., yet Kiener, in Coq. Viv., when describing and figuring the species from the Lamarckian Collection, says the locality is unknown. I am not aware on what authority Tryon gives South Australia. The excellent plate in Coq. Viv., p. 26, pl. xiii., fig. 1, is that of quite a different shell from our *F. ustulatus*. The former is thin, very ventricose, and has marked, slightly wavy, transverse, dark-chocolate-brown spiral lines; whereas the latter is solid, by no means ventricose, much more attenuated in the spire, and ornamented only with a little scorching on the longitudinal costæ. Chenu's figure of *F. sulcatus* (Manuel de Conchyliologie, p. 140) is evidently not drawn from Lamarck's shell, and is as evidently *F. ustulatus*; here is the explanation of Tate's synonymy.

*Hab.*—No locality was known to Reeve, but Angas recorded it from St. Vincent Gulf. I have it from three widely separated beaches in this Gulf, and dredged in life, but small, at 19-24 fathoms. Encounter and Lacepede Bays (*D. J. Adcock*).

*Micoculus* 4. *F. Dunkeri*, Jonas.

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*Ref.*—Malak. Beitrag, 1844, p. 129; Abbild, &c., Phil., 1844, vol. II., p. 191, t. 4, fig. 4.

Tryon says (Man. of Conch., vol. III., p. 60) "this is evidently a very much worn specimen, and perhaps not adult; the locality also has not been confirmed by subsequent collectors," i.e., the western coast of New Holland. I have a specimen from Eyre's Sand Patch, which is on the southern coast of Western Australia. He further remarks, "Dr. Philippi considered *F. Taylorianus*, Rve., a synonym, but I do not think the condition of *F. Dunkeri* justifies a positive conclusion. If the two species be merged, the

adopted name will be *Dunkeri*, which has decided priority of publication." Also "*F. Taylorianus*, Rve., appears to be a worn immature state of *F. cinereus*, Rve.," loc. cit. The worn state of Jonas's specimen is not so evident to me. It is certainly the same shell as *Siphonalia fuscozonata*, Angas (Proc. Zool. Soc., 1865, p. 56), which from Jonas's priority of definition becomes a synonym. It is not a *Siphonalia*, but a *Fusus*, as is plain from its dentition given in pl. iii., fig. 6. In Mr. Adcock's list it is classed as a *Peristernia*, but it has no trace of columellar folds.

*Hab.*—St. Vincent and Spencer Gulfs, Encounter Bay.

Dredged alive at all depths from 9 to 22 fathoms (*Verco*).

### *Microcoleus* 5. *F. Lincolnensis*, Crosse. 653

*Ref.*—Jour. de Conch., XIII., 53, t. 2, fig. 4, 1865.

Type from Port Lincoln, S.A.

Tryon says (Man. of Conch., vol. III., p. 66), "The coloration and very short canal remove this species from *Fusus*, yet I do not know where to locate it. Resembles a *Muricidea*." Its dentition I have shown on pl. iii., fig. 7. There is a rachidian tooth with three small cusps, and long curved saw-like laterals. The prongs of these are very variable in size, not only on any particular lateral, but even corresponding prongs on any pair of laterals, or on consecutive laterals. The radula disposes at once of any suggestion to place it among the *Muricidae* as a *Muricidea* or *Ocinebra*, and classes it with the *Fusidae*; while the absence of columellar folds decides its position in the genus *Fusus*. However, unlike ordinary species of the genus, it is left there by a process of exclusion.

*Hab.*—Spencer Gulf, St. Vincent Gulf, Encounter Bay.

Dredged alive, 10 fathoms, 1; 16 fathoms, 1; 20 fathoms, 1; 22 fathoms, 1; and dead at all depths from 9 to 22 fathoms, many (*Verco*). Under stones at low water, Port Lincoln (*Tate*).

*Fusus Novæ Hollandiæ*, Rve., and *Fusus Hanleyi*, Angas have not been collected in South Australian waters.

### GENUS FASCIOLARIA.

#### 1. *F. fusiformis*, Valenciennes.

*Ref.*—Kiener, Coq. Viv. Mon., p. 13, t. 4, fig. 2.

The habitat is given there as "The shores of New Holland," with the added note, "A species which still appears rare in collections. We do not know the locality. The Museum (i.e., the Paris Natural History Museum) has two individuals." The shell which has hitherto been considered as *F. fusiformis* among local collectors is only a comparatively smooth variety of *F. coronata*. The true species is rare here, and is represented by

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a specimen obtained by Mr. Adcock from Macdonnell Bay, and by two received by me from the same locality. It is a much smaller shell, 2 inches 3 lines, narrower, more regularly and abundantly spirally sulcated, and with well-marked numerous spiral liræ in the throat. Tryon doubts whether it is more than an extreme form of *F. filamentosa*, Lam. (Man., vol. III., p. 76).

*Pasciolaria* 2. *F. coronata*, Lam.

*Ref.*—Edit. 2, vol. IX., 435; Reeve, Mon., t. 6.

Type specimens from King and Kangaroo Islands.

Figured and described in Coq. Viv., p. 9, pl. ix., fig. 1, "A species rather common."

This is one of the most common of our Gasteropods, and one of the most variable. Some large specimens may be markedly angulated and coronated throughout all their whorls. Others may lose both angles and tubercles as early as the fourth whorl. These constitute the variety which has usually been regarded as *F. fusiformis*, but in all other respects they correspond with *F. coronata*. Others, after continuing in this form for one or two whorls, again assume the typical shape, and so demonstrate the freedom from angle and tubercles to be only a partial, and not even an individual variation.

*Hab.*—Throughout whole South Australian coast-line, at low tides attached to rocks.

Dredged alive, not common, up to 22 fathoms (*Verco*). Radula, pl. iii., fig. 8.

GENUS LATIRUS.

1. *L. aurantiacus*, Verco.

*Ref.*—*Antea*, p. 79.

Unique. Dredged alive, Backstairs Passage, 18½ fathoms, (*Verco*).

*Dolicholathyrus* 2. *L. Pulleinei*, Verco.

*Ref.*—*Antea*, p. 80.

Type from Eyre's Sand Patch, W. Australia.

*Hab.*—Largs Bay, St. Vincent Gulf (*D. J. Adcock*); sub-fossil in dredged silt, Port Adelaide (*Perks*).

GENUS LATIROFUSUS.

1. *L. nigrofusca*, Tate.

*Ref.*—Proc. Roy. Soc. S.A., vol. XIV., part II., p. 258, pl. xi., fig. 3.

Dredged alive, St. Vincent Gulf, 3-4 fathoms (*Matthews*); ? depth (*Verco*); Spencer Gulf, 13 fathoms, 1 (*Verco*); shell sand, Aldinga Bay (*Kimber*); Encounter Bay (*Adcock*).



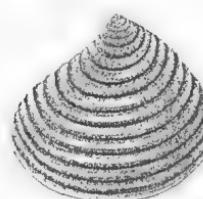
1



2



1a



3



4c



4a



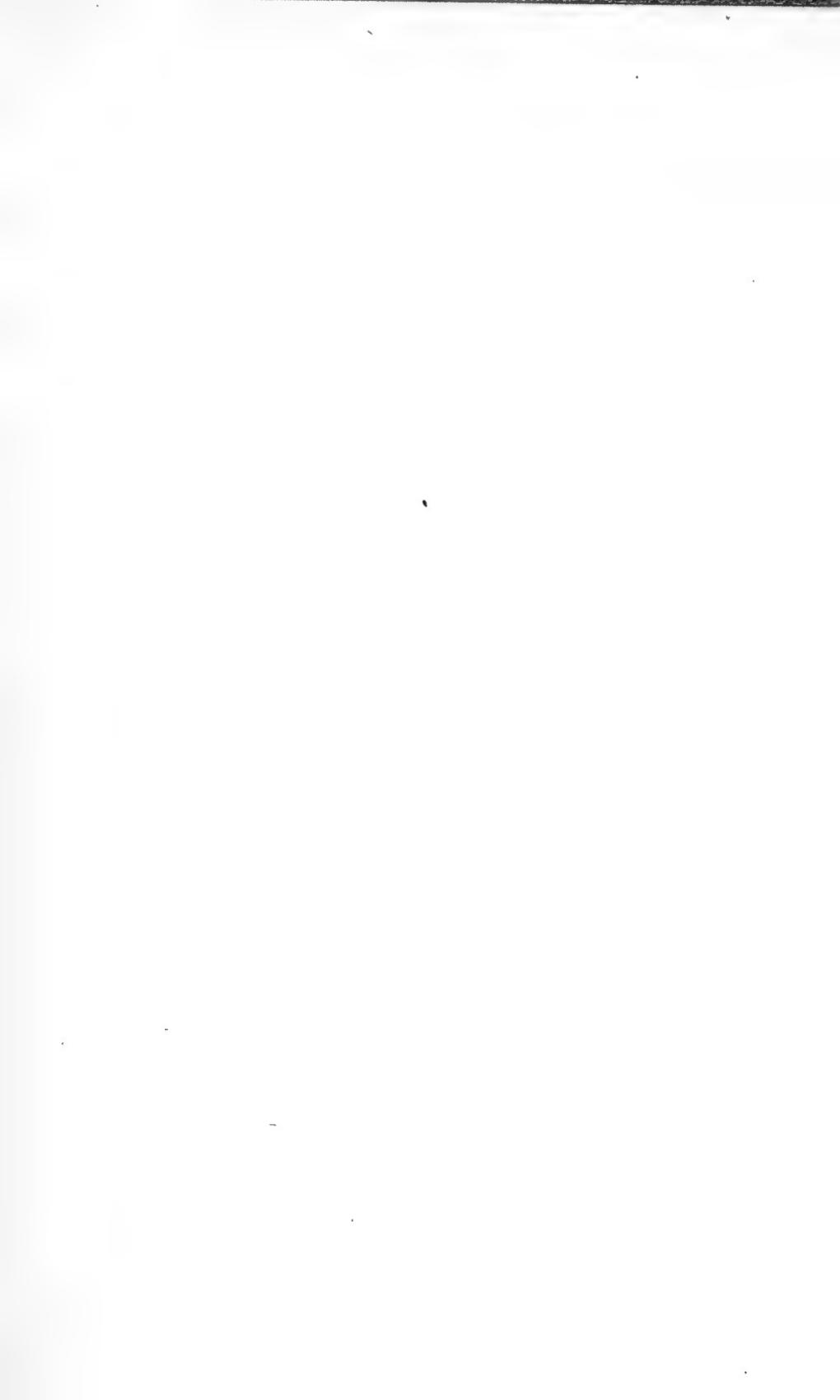
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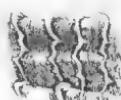
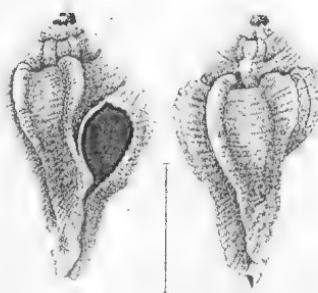


6a





1

1<sup>b</sup>1<sup>a</sup>

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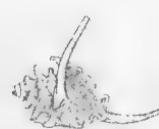
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4

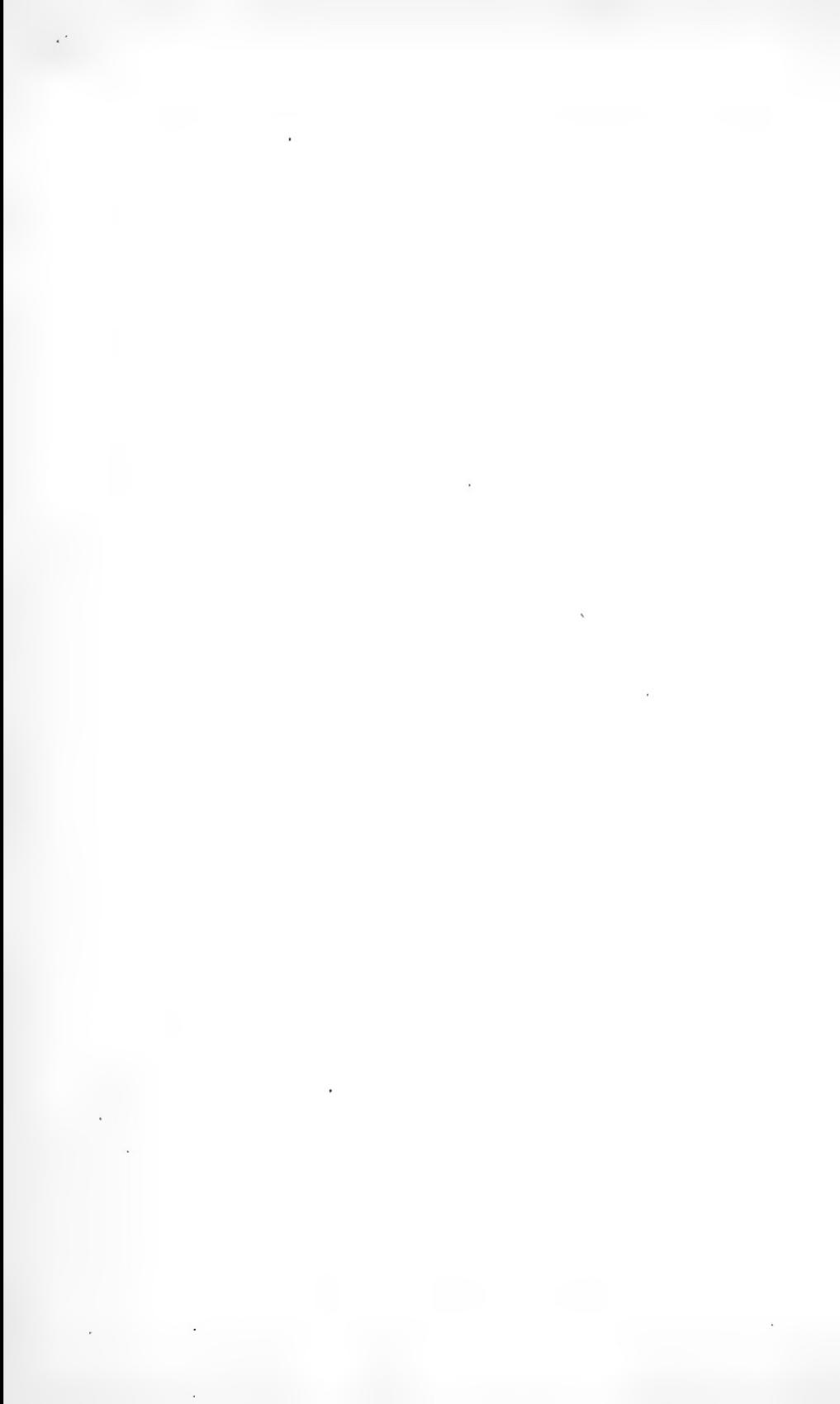
4<sup>a</sup>

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3<sup>a</sup>

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5<sup>a</sup>





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2



3



4



5



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Oct 1896

## DESCRIPTIONS OF NEW SPECIES OF MARINE MOLLUSCA OF SOUTH AUSTRALIA.

By Jos. C. VERCO, M.D., Lond., &c.

[From the Transactions of the Royal Society of South Australia, 1896.]

[Read October 6, 1896.]

*Notopelium* PLATES VI.—VIII. *YOL 4*

*Voluta translucidum* <sup>um</sup> spec. nov. Pl. vi., figs. 4 and 4a.

Shell elongately ovate, very thin, diaphanous smooth and glistening, of six whorls including the nucleus. This is inconspicuous, merging imperceptibly into the spire-whorls, apparently consisting of one turn and a half, very flatly convex at the apex, smooth. Spire-whorls sloping, slightly convex, suture simple, surface smooth, but for very obsolete incremental striae. Body-whorl relatively large, smooth but for obsolete longitudinal striae, which become more conspicuous toward the aperture, especially anteriorly and over the scarcely raised varix of the notch. Aperture elongate-ovate, narrowed posteriorly, dilated anteriorly, and with a very wide shallow notch. Outer lip simple acute thin convex when viewed either laterally or from below. Columella convex in the posterior half, almost straight anteriorly; no callus of the inner lip; fourplicate, the lower three plicae well-marked narrow and equi-distant, the uppermost less raised and at a less distance.

Ornament, a narrow spiral reddish-brown line close beneath the suture; longitudinal narrow curved lines of the same color, about 16 in the body-whorl, composed of minute zigzags or of very small spirally elongated spots; two indefinite spiral color-bands encircle the whorl, one at the level of the posterior angle of the aperture, another just above the level of the highest columellar plait winding over the dorsum of the notch, composed of prolongations of the zigzags between the longitudinal lines, and thickening of the spots in the lines

Total length, 39·5 mm.; greatest width, 16 mm.; spire, 14·5. Length of aperture, 25 mm.; width, 7 mm.

*Habitat*.—One perfect dead specimen 20 fathoms off Newland Head, outside Backstairs Passage; broken fragments of two in six to ten fathoms Yatala Shoal, and six small immature dead specimens from dredge siftings 22 fathoms Backstairs Passage (Verco).

1896 A.D.

in my  
Collection  
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*AUSTROHarpa punetata*, spec. nov. Pl. vi., figs. 3, 3a, 3b.

Shell roundly-ovate, rather thin, smooth, glistening, of four and a-half whorls. Nucleus one turn and a-half, slightly mammillate, apex inserted, first whorl rather excentric, next half-whorl marked off from the first by a depressed scar; suture simple and distinct; distinguished from spire-whorls by its smoothness, but for minute sublenticular longitudinal striae, and by absence of ornament. Spire-whorls two, gradated, with a marked very slightly rounded angle, behind which the first turn is subconvex, becoming gradually less so, the second, is subconcave, and in front of which both are slopingly subconvex; very minutely longitudinally striated under the lens, best seen behind the angle, and still more minutely spirally incised. On the second spire-whorl are also erect reflected curved scales, at gradually increasing intervals, best seen behind the angle, and continuous anteriorly with slightly prominent subvaricose longitudinal striae. Body-whorl ventricose, slightly excavated close to the suture, forming a slightly rounded angle, then uniformly sloping-convex; surface divided into ten longitudinal areas by the remains of slightly projecting lips, which behind the angle form erect, rounded, slightly-reflected plates, the earlier ones more and more worn away; the areas finely longitudinally and spirally incisedly striate. Aperture large, nearly plano-convex; outer lip uniformly convex, simple, very slightly thickened outside, rather more so about two lines within, edge almost sharp; posteriorly ascending for two lines, slightly reflected and pointed, and forming a marked notch at the suture. Columella slightly convex behind, nearly straight in the anterior half, excavated in the lower fifth. Inner lip distinct, smooth, with callus increasing in thickness from behind forward; posteriorly it forms a short sinus with the ascending outer lip, then is applied spreading somewhat and uniformly over the body-whorl; in the lower half with a free margin least marked where it crosses the varix of the notch, then slightly inflected and incurved to the extremity of the columella. Anterior notch distinct and everted and recurved.

Ornament, nucleus, and spire-whorls of a uniform salmon tint. The latter and the body-whorl closely dotted with small deep chestnut spots, their spiral diameter twice as great as their longitudinal, arranged in longitudinal series so that the dot of each is opposite the space in the next. The body-whorl has also two broad salmon-coloured spiral bands, one from the back of the aperture to a little above the middle of the lip, the other from a little above the middle of the aperture to the lower third of the lip. Just behind the remains of previous lips in these bands are crescents of dark chestnut, and similar crescents are found here and there on the body and spire-whorls close to the suture

*Continued page 213 (Eng. Ver p. 33)*

*South Australian "Harpa"*

1913 AD

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NOTE ON *HARPA (EOCITHARA) PUNCTATA* Verco.

Geo. P. Tate

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvii., 1913.]

1913

*Harpa punctata*, Verco, Trans. Roy. Soc., S.A., 1896, vol. xx., p. 218. Type locality—Off Newland Head in 20 fathoms.

During the past seventeen years three more examples of this shell have been taken—one at Normanville, in the possession of Mr. Kimber; one by Mr. Saunders at American River, Kangaroo Island; and one by Master Francis Arnold at St. Francis Island. The first two are somewhat broken, but the last is a beautiful specimen of a yellowish-salmon tint, with obscure lighter clouded bands as in the type, but not showing its crescentic dark blotches, and numerous punctations.

The original specimens measured 32 mm. in length by 21 mm. in greatest width, and 33 mm. by 22 mm. The St. Francis Island example measures 34 mm. by 24 mm., so that it is the largest example known. All these are mature, as evidenced by the ascent of the suture at the aperture as in the genus *Scaphella*.

It was classed when described as a *Harpa*, but now it is placed in *Eocithara*, a section of that genus created by Fischer in 1883 for the reception of Eocene fossils. Cossmann, in his *Paleoconchologie Comparée*, gives the differential characters of the section, *viz.*, "the columellar border forms a thin, rather wide callosity, which does not spread over the base, nor over the spire whorls, and is bounded outside by a quite distinct margin. This border, too, is detached anteriorly, and forms an umbilical cleft more or less deep instead of spreading itself over the basal pad. Then the siphonal notch is narrower and more deeply cut into this pad, so that when the shell is viewed from the dorsum, the notch forms nearly a semicircle. Finally the riblets are more completely folded upon the suture, and cover it, joining one another; though this last character is less visible in the South Australian *Eocithara*, which have besides a more globular protoconch."

These characters are found in *Harpa punctata*, which has, besides, well marked, the two special features of the South Australian fossil examples of *Eocithara*, *viz.*, the globular protoconch, and the failure of the costules to join one another by folding themselves along the suture.

Professor Tate, in the Transactions of the Royal Society of South Australia, 1888, vol. xi., p. 149, in a paper on "The Gastropods of the Older Tertiary of Australia," describes eight species of *Harpa*, and in Proceedings Royal Society, N.S. Wales, 1893, vol. xxvii., p. 173, a ninth species. By the

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courtesy of Mr. W. Howchin, the Curator of the Tate Museum in the University of Adelaide, I have examined the types of these and find they all belong to this section.

Comparison of *H. punctata* with those most nearly allied to it establishes its claim as an independent species. *H. tenuis*, Tate, has 24 ribs instead of 12, and a more pronounced shoulder which is further from the suture. *H. pulligera*, Tate, is much larger, has 29 ribs, a more angulated shoulder, and a much more prominent pullus, the sutures of which are hidden by the first spire whorl. *H. pachycheila*, Tate, is more pyriform, has 15 ribs, which are much stouter, and more prominent, and has marginate sutures. *H. abbreviata*, Tate, has 24 ribs, a less prominent shoulder, with a sloping area between this and the suture, and is much more contracted anteriorly.

Fischer, in his "Manuel de Conchyliologie," 1887, p. 601, gives the Eocene period as that of the *Eocithara*, as indicated, indeed, by its name. Cossmann's localities are Eocene, two species from the Paris Basin, and several species in Australia (all these are Tate's); Oligocene, one probable species.

When I described my novelty I noted the interesting discovery of a new species of the genus *Harpa*, which Tryon referred to as "a completed genus, no new forms rewarding the industry of modern investigators and explorers." But the interest is greatly augmented by the recognition that it does not belong to the same section of *Harpa* as any other known recent species, but without doubt to the section *Eocithara*, which flourished in the Eocene period, the earliest of Tertiary times. Further, that it is—as far as I can gather—the only known living representative of this section. Two other points of interest are noteworthy. That here in Australia, where nine out of a possible dozen species of fossil *Eocithara* are found, the one known living species of this section should occur. And also that all the fossils which certainly pertain to this section are attributed to the Eocene period, the oldest of the Tertiaries; that in the Oligocene, the next oldest, there should be but one described species, and that only probable; that none should have been yet taken from the Miocene, Pliocene, or Pleistocene, and yet an *Eocithara*, certainly congeneric and even closely allied specifically, should be living in our South Australian seas.

Jos. C. VERCO.

1913 A.D.

NOTE ON *LASEA SCALARIS*, Phillipi.

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvii., 1913.]

When Dr. Torr was gathering chitons at Port Arthur, in Tasmania, in 1912, he collected from the rocks at low tides a number of *Turridula teresiae*, Tenison-Woods, alive, which he kindly gave to me. Among these were six examples containing living *L. scalaris*. The ventral part of the *Lasaea* was in the aperture of the *Turridula*, and the dorsal portion projected beyond its margin. In two instances the umbos were turned towards the back part of the aperture, and in four towards the front part, so that the position was not uniform. They filled from one-half to two-thirds of the opening of the shell. Their occurrence in this situation may be *accidental*. They might have fallen into the aperture in the bag of the collector, after having been gathered in the same locality; or they might have been drawn into the aperture unintentionally by the animal when disturbed in the water, or when placed in the bag. Their *accidental* presence seems rather unlikely, since six specimens were obtained, and the bivalve was so similarly placed. As the *Turridula* is siphonotomous, and this usually indicates a carnivorous habit, the *T. teresiae* might have been consuming the bivalve, whose presence may be *festal*. *Lasaea scalaris*, like other bivalves, is bored by predatory gasteropods. Other individuals taken at low tides, Port Arthur, show the resulting round holes, some in the right, others in the left valve, at varying distances from the umbo. I removed five of the six bivalves from the apertures, and examined them carefully under a stereoscopic microscope, but could detect no hole, however minute, and no spot where the sculpture of the shell had been defaced by any initial boring. The only damage, detected in one shell, was a minute piece removed from the ventral border of one valve, but this might have been an accidental injury. If the gasteropods feed on the bivalve they must have been disturbed directly they settled on their prey, and before they had rasped any circular area in the shell sufficiently to leave any evidence of the process. Is it possible the association is *commensal*? *Lasaea* belongs to the family Erycinidae, in which are the genera *Montacuta* and *Kellia*, both of which anchor themselves by a byssus, and *Lasaea* is intermediate between them in classification. It is commonly found alive, in abundance, in the crevices between the tubes of the coral-like annelid masses on piles of wharves and piers. If it attaches itself to the inside of the aperture of *T. teresiae*, it would so block it as to prevent the extrusion of the gasteropod; so it would need to anchor itself to some part of the body of its host, so as to be pushed out and drawn in

with it. The most likely point of attachment would be an operculum; then when the animal was withdrawn into the shell it would draw the bivalve within the aperture, and when the animal extruded itself and crawled about on the ventral surface of its foot, the bivalve could ride in safety fixed to the operculum on the dorsum of the foot. Some of the Mitridæ have opercula, especially the smaller forms, and *T. teresiae* may; but though I tried to determine this point, I could not find the operculum in two of the examples examined, but they had been largely destroyed by carnivorous larvae. This note is published to direct attention to the bare possibility of commensal association between a bivalve and a gasteropod, and to suggest investigation by any who can get fresh material as to whether the *L. scalaris* is commonly found in the apertures of gasteropods, and especially of *T. teresiae*, and whether this shellfish is possessed of an operculum and whether it is carnivorous.

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GLENELG,  
SOUTH ADELAIDE.

219 1896 A.D.

Behind these bands is one narrower and less distinct, and another at and behind the angle; one between the broad bands, and two in front of the lower one. Between all the bands are narrow indistinct whitish areas. The inner edge of the lip is white, with less distinct and narrower coloured areas corresponding with the bands outside. The throat is translucent, and reveals faintly the external dots and bands.

*Habitat*.—Two recent and two broken shells, 20 fathoms Newland Head; one immature dead and one broken, 22 fathoms Backstairs Passage (*Verco*).

This new species cannot be confounded with any other form. The distant ribs and dotted ornament distinguish it at once.

Tryon says, in his Man. of Conch., Vol. V., p. 97, "Like *Strombus*, *Harpa* appears to be a completed genus, no new forms rewarding the industry of modern investigators and explorers." The discovery of a new species is, therefore, of peculiar interest. And this is increased by the fact that the two other Australian forms, *H. ventricosa*, Lam., and *H. minor*, Lam., are inhabitants of the warmer regions of the North and North-West parts of the continent.

*Fasciolaria*  
~~Tritonidea~~ (*Cantharulus*, Meek, 1876) *fusiformis*, spec. nov. 645

Pl. vi., figs. 1, 1a, 1b; var., 2, 2a.

Shell ovately fusiform, solid, whorls seven, including the nucleus. Nucleus conspicuous, of two turns, smooth, convex; suture deep, apex slightly exserted (in specimens as usually found on the beach it is inconspicuous, and nearly flat.) Spire-whorls four, convex, sutures regular distinct, impressed; longitudinal costæ regular round, width rather greater than the intervals or the height. Thirteen in the penultimate whorl, crossed by spiral liræ, rounded, valid, not quite so wide as the interstices, nine primary in the penultimate, with two or three secondary threadlets in the wider spaces; very numerous fine longitudinal sub-lenticular incised striae. Body-whorl uniformly convex, contracted anteriorly; 11 to 12 longitudinal costæ, most marked posteriorly, becoming less valid in front of the periphery. About 30 spiral liræ, fairly regular, with an occasional interstitial threadlet crossed by minute incremental incised striae. Aperture elongately oval, somewhat narrowed anteriorly. Outer lip uniformly convex, margin sharp, minutely crenulated throughout, outside varicosely thickened from suture to notch by a rounded pad with a corresponding furrow inside of varying depth in different specimens; internally otherwise smooth, save for an obsolete blunt tooth-like process close to the suture; in some individuals there are seven or eight narrow plicate denticles nearly equidistant. Columella concavely arcuate above, straight

and slightly sinistrally oblique below, the junction marked by a scarcely bifid spiral callus plica. Inner lip with a thin smooth shining callus applied posteriorly, margined in the lower third, in some individuals with a margin just free throughout; a spiral tooth-like blunt process close to the suture forms with a corresponding one on the outer lip a kind of sinus. Canal short, rather wide, outer lip just everted; scarcely recurved, notched anteriorly. Ornament faint rusty-brown with narrow white band above the sutures, and encircling the body-whorl just above the middle; bounded above by a line one-third of its width, of darker colour, generally most marked on the costæ so as to appear somewhat articulated; a similar but less marked line bounds it below; irregular rust-coloured longitudinal flames extend from the white bands to the anterior extremity of the body-whorl; interior of aperture of a rusty-purplish colour with an indistinct broad whitish spiral band. In life a thin minutely hairy periostracum covers all the shell except the nucleus, and almost hides the ornament.

Total length, 17 mm.; greatest width, 8·5 mm.; length of spire, 8 mm.; body-whorl, 9 mm.

*Habitat*.—Dredged alive 15 fathoms Investigators Straits, one; off Middleton, 15 fathoms, one recent; 20 fathoms in and outside Backstairs Passage, one recent and one dead (*Verco*), Spencer Gulf.

Variety, *T. Adcocki*. Rather more solid, with about 11 spiral liræ in the body-whorl, which become progressively stouter and more distant anteriorly with one or two interstitial threadlets, and where the liræ are stoutest with secondary threadlets on their sides. The longitudinal costæ are rather narrower and higher and quite pronounced posteriorly, but below the periphery they are almost broken up into very large tubercles on the spiral liræ. The aperture is generally more contracted, there are seven well-marked teeth inside the outer lip, besides the posterior process. On the inner lip the columellar projection anteriorly is validly bifid, and at the margin of the lip there are four rather distant teeth in a series diminishing backwards, besides the well-marked posterior tubercle. The white band with its dark margins is less conspicuous, the longitudinal rusty waved flames are rather more marked, though somewhat broken up into dots or blotches chiefly on the nodular intersections of costæ and liræ. Intermediate forms connect this variety with the typical species.

*Habitat*.—Middleton Beach (*D. J. Adcock*).

*Diagnosis*.—Hitherto, in South Australia, it has been called *Cantharus rubiginosus*, Rve., but is quite distinct from that. Its nearest ally appears to be *Buccinum D'Orbignyi*, Payrandeau,

Cat. Moll. de Corse, p. 159, pl. 8, f. 4 to 6; also Conch. Icon. Rve. Bucc., f. 44; Man. of Conch. Tryon, Cantharus, vol. III., p. 158, pl. 73, f. 266. Variety *C. Adeocki* approaches this; but from the description, which is meagre, and from the plate, one would judge that the costae of the foreign shell are less numerous and more valid, the canal is less oblique, while the ornament, beautifully variegated with black and yellow, is different.

**Triton (Argobuccinum) mimeticus, Tate (*Sipho*).**

Pl. vi., figs. 6, 6a, 6b.

This shell was referred to by me in a previous paper as *Triton mimeticus*, Tate, and I place it now in the subgenus *Argobuccinum*. I obtained a living specimen in 20 fathoms off Newland Head, and a recent dead one in 17 fathoms off Porpoise Head, both places just outside Backstairs Passage, as well as a dead specimen, and fragments of two more. The first two have each three varices, and of these the first lies close behind the third. The canal figured in Proc. Roy. Soc., S.A., 1895, vol. XIX., pl. ii., f. 4, 4a, was fractured. In a living shell 25 mm. in length, with an aperture of 8·5 mm. long, the canal is 8·75 mm. in length. Nearly closed at first, it gradually becomes about twice as widely open at the anterior as at the posterior end; the whole canal is slightly uniformly recurved. There is no periostracum. Above the row of tubercles the shell is fulvous brown, with deeper-tinted blotches; the tubercles are white. Below these it is fulvous-brown, except for a spiral white band about two lines in width, bounded above and below by a fine line articulated white and brown, the joints being rather long, the lower one on the obsolete carina. A third articulated line is at an equal distance in front. The anterior extremity of the canal becomes gradually deep brown. On the outside of the outer lip are four equidistant, rather large squarish brown spots. Operculum large, filling the aperture, ovate, nucleus apical. The dentition (Pl. vi., fig. 6b) shows a central rachidian tooth five-cusped, an inner uncinus or lateral six or seven pointed, and two simple uncini, the inner sickle-shaped, the outer scimitar-shaped. The disposition of the varices is that of *Ranella* and *Argobuccinum*, and the peculiar flat shape of the shell brings it into alliance with these. The simplicity of the uncini, their freedom from saw-points, suggests relation with *Ranella* rather than *Triton*. But the length of the anterior canal compared with that of the aperture, which it fully equals, is found in *Triton*, but is an unknown character in *Ranella*. The only Ranelliform shell in which the canal approaches the aperture in length is *Argobuccinum gigantea*, Lam., and no *Ranella* is known to me in which, as in this, the canal equals one-third of the total length of the shell. The apical nucleus of the

operculum, and the absence of a posterior canal, locate it in *Argo-buccinum* as a subgenus of *Triton*, with affinities to *Ranella*.

*Exomilus Drillia telescopialis*, spec. nov. Pl. vii., figs. 1, 1a, 1b. 812

Shell minute, thin. Whorls six, including the nucleus. Nucleus one turn and a half, smooth, with deep impressed suture, apex exserted. Spire-whorls sloping, nearly straight, gradated, angled at junction of posterior and middle fourth; behind this the whorl is bevelled to the suture, which is distinct and impressed. Whorls sculptured with spiral liræ, four to six in front of the angle, two behind it, flatly rounded, equidistant, wider than the interspaces. Longitudinal liræ numerous, equidistant, about 20 in the penultimate whorl, narrower than the interspaces; in some specimens crossing the spiral liræ and wider than them, generally most marked and forming conspicuous costæ in the second and third spire-whorls; in others narrower, crossed by the spiral liræ, giving a cancellated appearance. Body-whorl nearly cylindrical, angled a little below the suture and again at the periphery, below which it is excavately contracted to the base; provided with spiral liræ, two behind the upper angle, about seven between the angles, and nine or ten below, the most valid forming a minute carina at the lower angle, crossing or crossed by 18 to 20 wider or narrower longitudinal liræ continued to the base, though less conspicuous here. Aperture elongately rhomboidal; wider anteriorly. Outer lip simple, thin, crenulated, with a well-marked semi-circular sinus from the posterior angulation to the suture, lip slanting obliquely from the carina to the anterior notch. Columella straight, inner lip inconspicuous except behind, where there is a columellar callus, from which springs the acute upper boundary of the sinus. Notch simple, anterior extremity truncated obliquely to the left. Ornament uniform, rusty-brown or white.

Length, 45 mm.; breadth, 1·25 mm.

*Habitat*.—Backstairs Passage, 14 dead.

Types in my cabinet.

*Diagnosis*.—I know no *Drillia* with an approximate form.

→ *Drillia pentagonalis*, spec. nov. Pl. vii., figs. 2, 2a. 810

Shell minute, telescope-shaped, rather thick. Whorls four and a half, without the nucleus. Nucleus absent. Spire gradated, whorls straight-sided in the anterior three-fourths, and bevelled at an angle of 45° to the posterior suture, which is distinct and simple. Five longitudinal ribs, continuous, narrow, erect, prominent; interspaces nearly flat, giving a pentagonal section. Sublenticular inconspicuous longitudinal and spiral striæ, which cross the ribs. Body-whorl with five longitudinal ribs, squarely rhomboidal, angulated near the suture, and carinated at the

periphery, the ribs having projecting points here, and the carina being curved between them; whorl excavately contracted below. Scarcely visible sublenticular longitudinal striae in upper part; rather less obsolete spiral striae; these are more valid below the carina, where seven can be counted on the ventral aspect. Aperture narrow, elongately oblong. Outer lip varicosely thickened by a rib, margin thin, simple, and sharp, straight for four-sevenths of its length, between the angle and the carina, curved towards the notch in the lower two-sevenths, and containing a well marked sinus in the upper seventh, rather more than a semi-circle, not quite reaching to the suture. Columella straight, slightly concave below, inner lip inconspicuous. Ornament unicoloured dull stony-white.

Length, 3·5 mm.; breadth, 1·25 mm.

*Habitat*.—Dredge siftings (probably Backstairs Passage), deep water, two dead (*Verco*).

*Diagnosis*.—From *D. telescopialis*, nobis, by the pentagonal shape, the five ribs, and the absence of cancellation.

Mitra Vincentiana, *spec. nov.* Pl. viii., fig. 3. *668*

Shell, elongately-fusiform, moderately solid. Nucleus detached in all specimens, and earlier whorls corroded. Spire, eight whorls, slightly convex; suture well marked, linear, minutely channelled. First three or four whorls longitudinally costate, costæ gradually becoming obsolete, but may sometimes be traced to the next whorl, and may be represented by indistinct and irregular plicæ over the rest of the spire; spiral threadlets rounded and indistinct, about 12 in the penultimate whorl; very minute sublenticular incremental longitudinal striae are also visible.

Body-whorl uniformly very slightly convex; faintly marked close-set longitudinal striae, and numerous low, unequal rounded spiral threadlets, least marked over its centre. A very distinct spiral furrow starts just above the highest columellar plica, and winds round the dorsum of the base with two or three shallower ones behind it, and about four or five wrinkles in front of it. Aperture oblique, narrow, elongate-oval, contracted above, opening widely into the notch below. Outer lip uniformly curved, except for slight central straightening, simple, thin, sharp, smooth internally. Columella straight, very slightly excavated anteriorly; plicæ four, well marked, intervals regularly narrowing anteriorly; sometimes the elevated anterior margin of the columella exactly simulates a small fifth plica. Inner lip scarcely visible, except below the lowest plica, whence the callus stretches to the notch; only in living specimens can the extent of the lip be recognised, and then only by the polished surface of the aper-

ture. Notch well marked, margins slightly everted. Ornament, uniform dull salmon colour.

Length, 19 mm.; breadth, 6.75 mm.; aperture length, 8.5 mm.; width, 2.75.

*Diagnosis*.—It differs from *M. Rosettæ*, Ang., in the costation of the earlier whorls, and in the absence of the punctated spiral incisions. It differs from *M. Australis*, Swns., in its more attenuated form, in the less abrupt contraction of the body-whorl below the periphery, the more uniform curve with a larger radius of the outer lip, and the consequent absence of the contraction of the lower part of the aperture; also in the relative length of the aperture and spire; in *M. Australis*, in the smaller shells, these are as 100 to 103.6, in the larger as 100 to 114.3, in *M. Vincentiana* as 100 to 131.4.

*Habitat*.—Investigators Straits from 13 to 15 fathoms, two recent; off Bank's Islands, Spencer Gulf, in 10 fathoms, one recent; Backstairs Passage, in 17 fathoms, one dead (*Verco*).

Types in my cabinet.

### *Epidora* *Sarcula* Perksi, spec. nov. Pl. vii., figs. 3, 3a, 3b, 3c. 744

Shell fusiformly ovate, solid, imperforate. Whorls ten, including nucleus. Nucleus two whorls, smooth, inflated, horn-colored. Spire, suture distinct, impressed, finely crenulated; whorls subconvex, with a groove at the junction of the upper and middle third; having a double row of granules just above it, and another row immediately below it. Numerous longitudinal wavy plicæ, about as wide as the intervals, and not quite so high, rounded, about 25 in the penultimate whorl. A abundant fine spiral striæ, 15 in the penultimate, crossing the plicæ, and making them granose. Body-whorl subinflated, contracted at the base, sculpture in the upper part as in the spire; longitudinal granose plicæ, about 40, following the sinuosities of the outer lip, lost at the extreme base, and becoming less valid and more crowded towards the aperture, cut by transverse striæ, which are irregularly alternately larger and smaller. Aperture oblique, elongate-ovate, constricted close to the suture. Outer lip thin, sharp, with a well-marked sinus, about three millimetres deep, with its centre 2.5 mm. from the suture, with the sides convex, and a concave bottom at the row of tiny nodules in front of the groove; a shallow anterior wide sinus just behind the notch of the canal. Canal very short, wide, open, notch rather large, oblique, its left border produced beyond the right; margins slightly everted. Columella straight, slight sinistral deviation anteriorly, smooth from removal of sculpture, callus very thin, applied, inconspicuous, barely free at the anterior extremity. Ornament greyish-white, with small deep rust-colored spots on the rows of granules

just below the suture (sometimes continued from these as wavy longitudinal lines), and on the spiral row just below the groove of the sinus, and finer spiral lines of spots on alternate transverse rows of costal granules, over the body-whorl to the base. Aperture white. Operculum moderately large, elongate-ovate acute (Pl. vii., fig. 3c).

Length, 20 mm.; breadth, 8·25 mm.; aperture length, 10·25; width, 3·25.

Type in my cabinet.

*Habitat*.—Five examples alive in 15 fathoms off Thistle Island, in weed, brought up in two successive casts off the dredge (*Verco*).

*Diagnosis*.—*S. Quoyi*, Rve., is a larger shell, with the subsutural band not at all or scarcely nodulated, and with large nodules in the groove of the sinus, and no longitudinal costæ. *S. Oweni*, Gray, has in the spire-whorls the sinus nodules immediately above the suture, instead of at or slightly above the centre of the whorls. The nodules are only half as numerous, 20 in the body-whorl instead of 40; its longitudinal plicæ are very fine, and are just twice the number of the nodules.

It is named after Dr. R. H. Perks, the Secretary of our Section, a naturalist well known in South Australia.

The character of the operculum with its apical nucleus suggests a doubt whether this shell should be placed in *Surcula*. Accordinging to Fischer, in his *Manuel de Conchyliologie*, p. 591, this genus has an operculum with its nucleus medio-lateral and internal like that of *Clavatula*, of which he gives a figure. I find, however, that the operculum of *Surcula Quoyi* has its nucleus apical. The two shells are conchologically closely allied. I place my species, therefore, with it, in *Surcula* for the present, and leave the character of the operculum and its importance as a generic diagnostic for further consideration.

### *Ostrotomitra*

*Turritella apicitineta*, spec. nov. Pl. viii., figs. 4, 4a, 4b.

675

Shell turretted, fusiform, rather thin, shining. Spire, elate of eight whorls, including nucleus. Nucleus distinct dextral, two turns, excentric, sometimes slightly mammillate, smooth, suture well marked, pinkish brown, retaining its color in the dead white shell, and prettily tinting its apex. Spire-whorls sloping, scarcely convex, the convexity varying in different individuals. Longitudinally finely costate throughout; costæ most valid in the earlier whorls, about 35 in the penultimate, slightly nodulated at the posterior suture, wider than the interstices in the earlier whorls, narrower in the later, rounded, rather broader than high; sutures distinct impressed. Transverse liræ numerous, three in the penultimate whorl, flattened, wider than the interstices,

which are scarcely more than incisions, crossing the costæ, but less valid there than in the intervening furrows. In the first three whorls, just below the suture (the distance increasing gradually in successive whorls) a well-marked transverse furrow cuts off a row of subsutural nodules from the costæ; in the fourth whorl this is less marked, and the other spiral furrows become nearly equal to it, gradually diminishing in depth towards the centre of the whorl. Last whorl subconvex, convexity varying slightly in different specimens, contracted just below the periphery. Longitudinal plicæ numerous, close-set, irregular in size and distance, degenerating into marked incremental striæ towards the aperture. Spiral incisions well marked below the suture to the middle of the whorl, obsolete in front of this, though still visible under the lens; five or six valid spiral furrows over the contracted part behind the notch. Aperture obliquely elongately oval. Outer lip nearly straight in the upper two-thirds, then bent to the left at an angle of  $135^{\circ}$ ; simple, acute. Columella straight for one-half its extent, then slightly bent to the left; plicæ four, sometimes the last forms the margin of the canal, sometimes is distinctly above it, equidistant, well marked, sometimes ceasing at the margin of the callus of the inner lip, which is sharply defined and at the lower part free, so as to form a minute rimate perforation with the varix of the notch. Canal wide, short, scarcely reflected, distinctly notched. Ornament, color greyish-white, a broad indistinct pinkish-brown subsutural band, maculated at intervals with deeper brown patches; in some examples only these are visible. On the body-whorl three indistinct fine bands either continuous or composed of brown dots, the highest of which appears on the spire-whorls, the lowest may be continuous over the anterior part of the shell from a little above the columellar plicæ. When dead, the shell is nearly pure white with a pinkish tip, and faint brownish maculations.

Length, 11·20 mm.; breadth, 3·5, or 10 mm. and 3·75; length of aperture, 4·5 mm.; width, 1 mm.

*Diagnosis*.—It resembles *M. Tasmanica*, Ten.-Woods. (lent to me by Mr. May, of Hobart), in the ribbing and transverse girdling, but the shape is different. The latter is ovate and attenuate at both ends, with these dimensions: 11 mm. long., 5 mm. broad; length of aperture, 6 mm. fully. It is brown, with two or three yellowish-white bands—mine is greyish-white, with brown bands, but this distinction may simply be a question of width of bands, in which circumstance mine vary widely.

*Habitat*.—St. Vincent Gulf, 17 fathoms, six dead; off Newland Head, 20 fathoms, nine dead (*Verco*).

Types in my cabinet.

*Peculata* <sup>227</sup> *Nibidae*

*Imbricaria porphyria*, spec. nov. Pl. viii., figs. 5, 5a.

682

Shell ovate-conic, solid, of five whorls, exclusive of nucleus. Nucleus two whorls, smooth, flattened, papillary. Spire short, slightly acute, about one-fourth the total length of the shell, whorls subconvex, roundly angled at lower part, longitudinal plicæ indistinct, low, inequidistant, closer on the posterior whorls, with finer distinct regular longitudinal striae under the lens. Spiral striae, about seven on the penultimate whorl, sublenticular, flat crowded, crossing the plicæ. Sutures distinct, very slightly margined, and minutely crenulated by the longitudinal striae. Body-whorl swollen just below the suture to form a rounded shoulder, then with a regular sloping curve to the anterior extremity. Fine sublenticular longitudinal growth-lines, close, most marked at the suture, and behind the shoulder, less marked near the aperture; spiral striae close-set, low, most marked behind the shoulder, and just above the notch, very faint over the rest of the whorl. Aperture narrow, widest in the middle, outer lip nearly straight, simple, acute, smooth. Inner lip straight, very thin polished callus. Three very distinct, equal, nearly transverse, equidistant plaits occupying the middle third of the aperture with an obsolete one immediately below. Ornament, uniform mauve tint inside and out, nucleus dark mauve; dead shells are white.

Length, 10 mm.; breadth, 5·75 mm.; spire, 2·25 mm.; length of aperture, 7·25; width, 1·25.

*Habitat*.—In and outside Backstairs Passage, Investigators Straits, dredged alive at 15 to 20 fathoms, five; and 36 recent and dead (*Verco*). West Coast of Yorke Peninsula (*Tate*).

Types in my cabinet.

P. Fischer in his *Manuel de Conchyliologie*, p. 614, says *Imbricaria* of Schumacher has no operculum. The shell I describe has one, but I leave the discussion of its generic location for a future communication.

*Josephia*

*Rhos tasmanica*, Ten.-Woods (*Josephia*). Pl. vi., figs. 5, 5a; Pl. viii., figs. 6, 6a.

629

Shell ovately fusiform, solid, opaque. Whorls including the nucleus 9; nucleus of two whorls, smooth, inflated. Spire-whorls convex, angled at their centre, behind this slightly excavated by a rather wide, conspicuous groove, behind this a prominent rounded subsutural band. Longitudinal plicæ numerous, regular, 16 in the penultimate whorl, slightly coronated at the angle, and forming slightly elongated nodules on the subsutural band. Distinct engraved spiral lines, crossing the plicæ, three or four in front of the angle, two or three in the groove, producing, if well marked, a row or two of small round granules there. Body-

whorl with the subsutural nodulated band, anterior to this the excavated groove, followed by its angle of junction with a uniform, slightly convex surface. The longitudinal plicæ may extend almost to the base, or may become obsolete at the periphery; and generally become less marked towards the aperture in older shells. Spiral engraved lines 13 to 15, equidistant, most marked at the base, so as to form there about five obliquely rounded spiral liræ. Aperture obliquely elongate-ovate, contracted behind between the subsutural band and a small columellar callus, minutely canaliculate. Outer lip simple, thin, slightly sinuous, internally seven narrow spiral plicate teeth, equidistant, extending to within a line of the margin. Columella nearly straight, concave at the base, where the callus is thick and closes the umbilicus; a rather broad spiral plica lies over the situation of the continuation backwards of the varix of the notch, it may be simple or bifid or three or four divided. Notch well marked, with minutely everted margins, varix of notch valid, and bounded above by a definite slightly elevated edge continuous with the sharp right margin of the notch. Ornament, rusty-brown or deep mahogany, with bluish-white patches composed of several oblong spots disposed between the engraved lines, most numerous just above and below the angulation and towards the base. In these areas the brown and whitish spots may be almost regularly articulated, or so disposed as to form longitudinal brown flames. Living shells are often brightly glistening, dead shells uniform dull rusty brown.

Length, 25 mm.; breadth, 10 mm.; spire, 14 mm.; aperture, 10 mm. long, 4.5 broad.

*Habitat*.—Along the whole coast of South Australia, at low water. Eyre's Sandpatch, West Australia, large specimens.

*Remarks*.—This shell has been known in South Australia as *Cominella suturalis*, A. Adams see list of Aquatic Mollusca of South Australia, D. J. Adcock, 1893. But that shell is a *Nassaria*, and as figured in Tryon's Man. of Conch., pl. 84, fig. 542, and as examined in a specimen sent to me identified by G. B. Sowerby, is a shell quite unlike the South Australian form. The dentition of *Nassaria*, as given in the Man. Vol. 3, pl. 27, fig. 34, shows a six-cusped rachidian tooth, while our shell has only three cusps. I had identified it as *Josephia Tasmanica*, Ten. Woods, Pros. Roy. Soc., Tasmania, 1878, p. 32, upon which he founded his subgenus *Josephia*; but it had never been figured, and on enquiry it was learned that the type specimens in the Hobart Museum had been mislaid, and could not be referred to. However, Miss Lodder, of Ulverstone, Tasmania, has lately forwarded to me two shells, identical with this *Phos Tasmanica*. They were found without a label among some shells presented by

Mr. Petterd to the Launceston Museum, and a label *Josephia Tasmanica*, in his handwriting, was found in the same box without any shells attached. Mr. Petterd, to whom she referred them, says he believes these shells are the co-types of Wood's species, which was described from shells in Mr. Petterd's possession. There is, therefore, no doubt about the identity. As to its generic location: Woods created the subgenus *Josephia* for it under *Cominella*, because of its columellar plait, but Tryon says, "If it is really distinct from *Cominella*, why is it not a *Phos*?" Man. of Conch., Vol. 3, p. 207. I know of no reason why it should not be regarded as a *Phos*. Its dentition, given on pl. viii., fig. 6, is identical with that of the genus *Phos* given in Tryon's Man. Vol. 3, pl. 27, fig. 35. Its shape approximates that of *Phos virgatus*, Hinds, op. cit., pl. 83, fig. 502, and it has a columellar plication. This varies in validity in different examples, but is always present, and is not merely a projection of the varix of the notch through a thin layer of columella callus. For this callus at its margin may be quite devoid of a plication, which is yet distinct enough a little further within the aperture, where it may show two, three, or four ridges which have been subsequently laid down. I have, therefore, placed it in the genus *Phos*, and discarded the subgenus *Josephia*.

*Myodora corrugata*, spec. nov. Pl. viii., figs. 1, 1a, 1b. *All F 139*

Shell transversely ovate, thin, subequilateral, inequivalue Umbos apposed, acute, retroflexed. Anterior dorsal margin uniformly slightly convex. Posterior dorsal margin uniformly slightly concave; the two forming an angle of about 130°. Ventral margin slightly convex, anteriorly rising rapidly to form a well-rounded curve with the front dorsal margin; posteriorly forming a marked angle, slightly more than a right angle, with the truncated posterior extremity; in large specimens the ventral margin is slightly concave in front of this angle. Posterior extremity almost vertically straightly truncated, the end sloping slightly downwards and forwards, making a right angle with the post-dorsal margin. Right valve convex, well-marked ridge from umbo to postero-inferior angle; sculptured with very distinct, regular, concentric ribs, about one-half the width of the inter-spaces, and as high as wide, smooth and rounded, continuous from one dorsal margin to the other. Left valve a little smaller than the right, almost flat, very slightly rounded transversely, an indistinct ridge from umbo to postero-inferior angle, behind which the surface is quite flat; sculpture like that of the right valve, but not quite so deep, especially behind the umbonal ridge. There is a long narrow post-umbonal area on the dorsal hinge-line, smooth, slightly excavated, the right valve composing rather

the larger part. Ventral margin very thin and simple. Internally, valves shining, pearly, indistinctly marked by the corrugations of the outside, furrows within corresponding with ridges without. A small triangular cartilage-pit within each apex; there is a small umbonal ossicle. The right valve has a long linear furrow, with a scarcely projecting long lamina at its inner margin, for the reception of a long lamina on the left valve along the whole of the post-dorsal margin. The edge of the anterior-dorsal margin of the right valve scarcely projects, so as to enclose the left valve, and allow it to rest on the ledge within.

Length, antero posterior, 14.25 mm.; umbo-ventral, 9 mm.; sectional diameter of apposed valves, 3.5 mm.

*Habitat*.—Dredged alive, 15 to 20 fathoms, Yankalilla Bay, Backstairs Passage, and Spencer Gulf five specimens, and 23 valves (*Verco*).

*Corbula compressa*, spec. nov. *Pl. viii.*, figs. 2, 2a, 2b. *323*

Shell triangular oval, solid, compressed, inequivalve, inequilateral. Umbols in contact, acute, curved slightly forwards. Posterior dorsal margin sloping, straight for two-thirds of its length, then descending at an obtuse angle. Anterior dorsal margin about three-fourths as long as the posterior, with which it makes rather more than a right angle, scarcely excavated in front of the umbos, and forming a well rounded anterior extremity with the ventral margin. The front half of this is straight, then slightly convexly ascending, to join the posterior dorsal margin at its junction with which it is slightly excavated, so as to form a minute beak. The right valve is larger than the left. Along the anterior dorsal margin, the rounded front end, and the anterior two-thirds of the post-dorsal margin, the right valve scarcely projects beyond the left. At the posterior extremity it is deeply folded over it at a very slightly rounded angle, the depth of the fold diminishing anteriorly. From the umbo on each valve a ridge curves obliquely forwards, but is soon lost in the rounded surface of the valves; another extends obliquely backwards to the posterior inferior angle, sharply defined. The post-umbonal area is, in the left valve, somewhat excavated throughout; in the right convex, except for a slightly concave groove close to the ridge, diminishing in width from the umbo backwards. Sculpture, concentric incremental striae, more distinct and at wider intervals with age, fewer and more valid in the left valve; in the left posterior umbonal area forming distant sharp ridges, in the right being very numerous and fine. In some specimens are radial interstitial raised microscopic striae on both valves, more marked on the left. Ornament china-white, mottled with small translucent brown irregular zig-zag spots, arranged somewhat radially.

Length, 10 mm.; breadth, 6·25 mm.; thickness, 4 mm.

*Habitat*.—Yankalilla Bay, in sludge, at 20 fathoms, many alive; Backstairs Passage, Port Lincoln, Eastern Cove, Kangaroo Island, at varying depths, several (*Verco*).

Types in my cabinet.

*Diagonisia*.—Its nearest ally in our waters is *C. scaphoides*, Hinds, but the latter is a more obese shell, the transverse section is more uniformly convex, the anterior dorsal margin is comparatively longer, the angle between the anterior and posterior margin is more obtuse, the left valve is not so included in the right posteriorly, the surface behind the umbonal ridge is not so wide, or so excavated, and so the ridge is not so valid. A nearer ally is *C. luteola*, Carpenter, from San Diego Bay, which has the same compressed form, but in this species the anterior part of the shell is longer than the posterior, the junction between the anterior dorsal margin and the ventral is a larger curve, and the right valve does not include the left.

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NOTE UPON MUREX UMBILICATUS, *Ten.-Woods*. Pl. vii.,  
figs. 4, 4a, 4b, 4c.

Adams's name *scalaris* has priority of Wood's *umbilicatus*, but the former is pre-occupied by Brocchi for a fossil *Murex*, and is thus excluded. So Tryon proposed the name of *M. Angasi* as a substitute for *scalaris* (Man. of Conch. Vol. II., p. 109). He did not, however, know its identity with *M. umbilicatus*. This latter name, therefore, has priority. The identity is vouched for by Brazier. He sent specimens of the shell to H. Adams, who said it was identical with that named *M. scalaris* by his brother, A. Adams (Proc. Linn. Soc. New South Wales, Vol. VIII., Part I., p. 116). Sowerby, in Thes. Conch. Mon. *Murex*, p. 54, gives it in his alphabetical list as *scalaris*, Ad., Gen. Fusus ?, without description or plate, and does not notice it in his Mon Fusus. Tryon gives no plate of either *scalaris* or *umbilicatus*; I have therefore had a figure of *M. umbilicatus*, *Ten.-Woods*, from St. Vincent Gulf, with its operculum executed.

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EXPLANATION OF PLATES.

PLATE VI.

- | Fig.       |  |
|------------|--|
| 1, 1a.     | <i>Tritonidea fusiformis</i> , <i>Verco</i> .          |
| 1b.        | Details of sculpture.                                  |
| 2, 2a.     | Var. <i>Adcocki</i> , <i>Verco</i> .                   |
| 3, 3a, 3b. | <i>Harpa punctata</i> , <i>Verco</i> .                 |
| 4, 4a.     | <i>Voluta translucida</i> , <i>Verco</i> .             |
| 5, 5a.     | <i>Phos tasmanica</i> , <i>Ten.-Woods</i> .            |
| 6.         | <i>Triton (Argobuccinum) mimeticus</i> , <i>Tate</i> . |
| 6a.        | Operculum of <i>Triton (Argobuccinum) mimeticus</i> .  |
| 6b.        | Dentition of <i>Triton (Argobuccinum) mimeticus</i> .  |

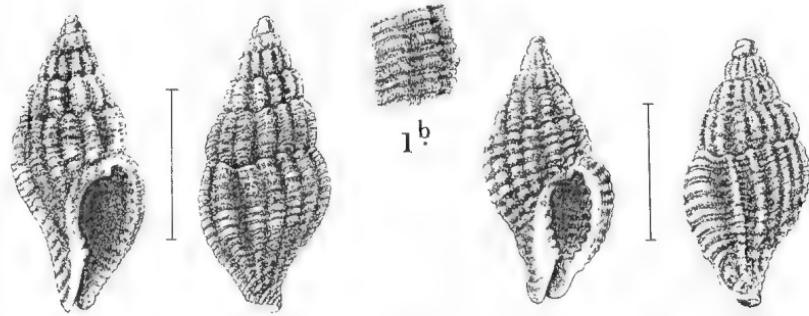
## PLATE VII.

- 1, 1a, 1b. *Drillia telescopialis*, Verco.  
 2, 2a. *Drillia pentagonalis*, Verco.  
 3, 3a. *Surcula Perksi*, Verco.  
 3b. *Surcula Perksi*, details of sculpture.  
 3c. *Surcula Perksi*, operculum.  
 4, 4a. *Murex umbilicatus*, Ten.-Woods.  
 4b. *Murex umbilicatus*, details of sculpture.  
 4c. *Murex umbilicatus*, operculum.

## PLATE VIII.

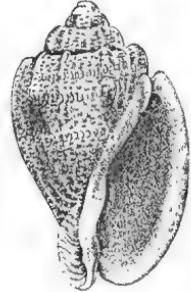
- 1, 1a, 1b. *Myodora corrugata*, Verco.  
 2, 2a, 2b. *Corbula compressa*, Verco.  
 3. *Mitra Vincentiana*, Verco.  
 4, 4a. *Turricula apicitincta*, Verco.  
 4b. *Turricula apicitincta*, details of sculpture.  
 5. *Imbricaria porphyria*, Verco; 5a. Operculum, anterior extremity  
     probably broken off.  
 6. Dentition of *Phos tasmanica*, Ten.-Woods.  
 6a. Operculum of *Phos tasmanica*, Ten.-Woods.





1 1<sup>a</sup>

2 2<sup>a</sup>



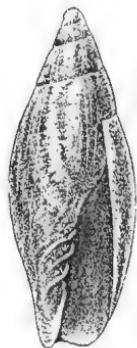
3



3<sup>b</sup>



3<sup>a</sup>



4



4<sup>a</sup>



5

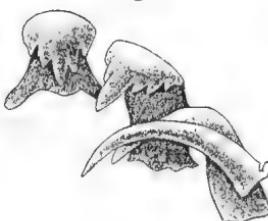


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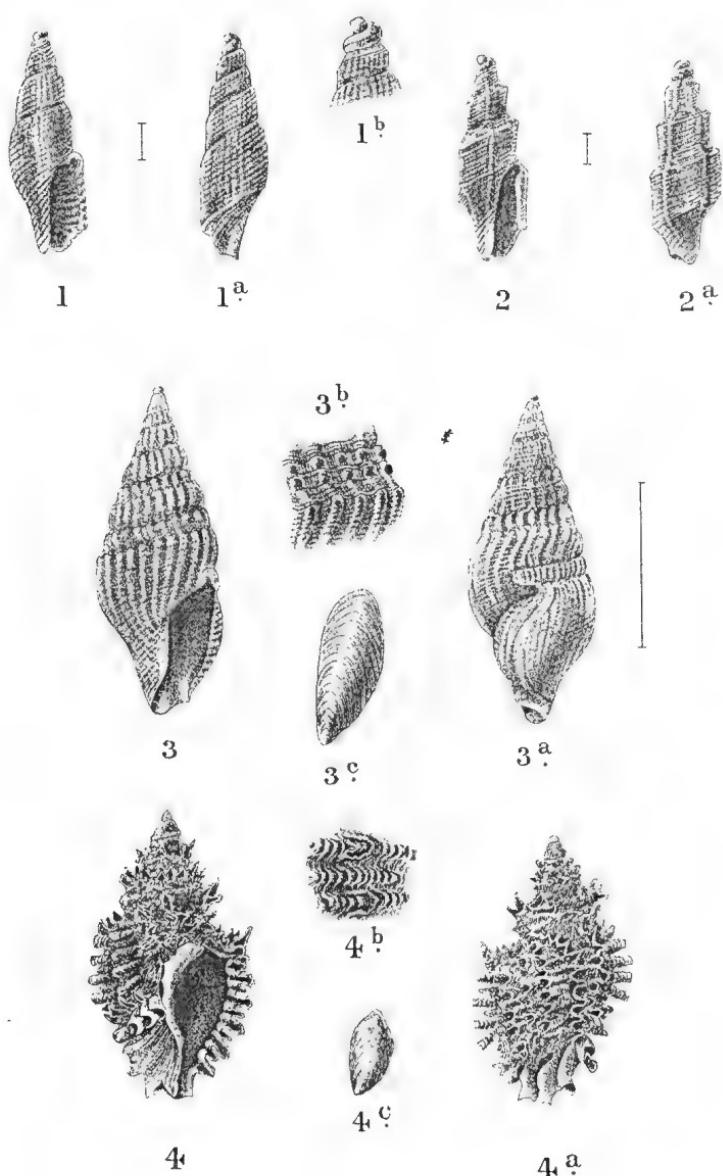


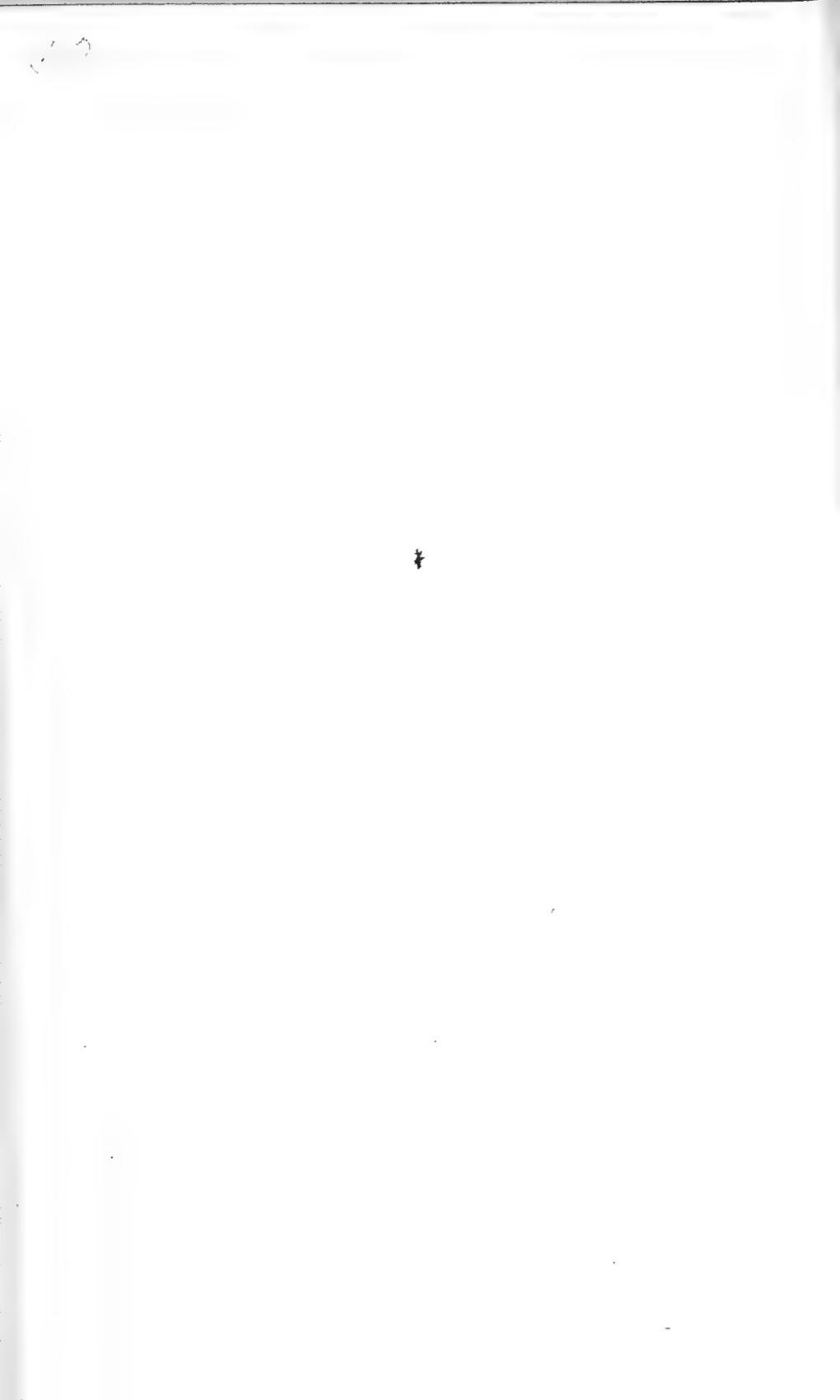
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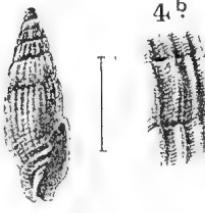
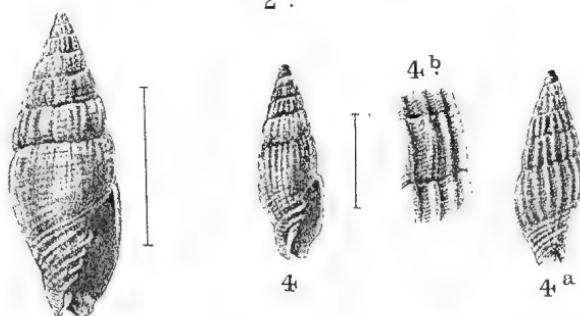
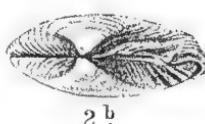


6<sup>b</sup>











NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES, PART I.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.), etc.

[Read August 2, 1904.]

PLATE XXVI.

*Dentalium intercalatum*, Gould.

Proc. Bost. Soc. Nat. Hist. vii., p. 166 (1859); Otia, p. 119; Sowerby in Conch. Icon., xviii., pl. vii., fig. 45 (1872). Type locality, China Seas (North Pacific Expl. Exped.). Pilsbry in Tryon's Manual of Conchology, vol. xvii., p. 25, pl. xi., figs. 88, 89. *D. Bednalli*, Pilsbry & Sharp, Man. of Conch., vol. xvii., p. 248, pl. xxxix., figs. 1, 2, 3; type locality, St. Vincent Gulf (W. T. Bednall). *D. octogonium*, Angas (non Lam.), P.Z.S., 1878, p. 868, Henley Beach, S.A.

Angas misidentified our shell from Henley Beach as *D. octogonium*, Lam., and cited it as a South Australian shell in P.Z.S., 1878, p. 868. Pilsbry & Sharp, in Tryon's Man. of Conch., vol. xvii., p. 248, described a shell under the name of *D. Bednalli*, from St. Vincent Gulf, sent to them by Mr. W. T. Bednall. This name would stand, were it not that specimens of our extremely variable species are inseparable from *D. intercalatum*, Gould, 1859, which has priority.

I have examined more than three hundred individuals, dredged by me in St. Vincent and Spencer Gulfs, Investigator Strait, and Backstairs Passage. They have been taken alive at all depths between eight and twenty-two fathoms, chiefly in muddy bottoms. I have vainly endeavoured to discover more than one species among them. They are exceedingly variable, and were it not for intermediate forms, quite a dozen species might be created.

Its length varies, of course: firstly, with its age; individuals when very young are only 5 millimetres, when senile 37; secondly, with the amount of its posterior end which has been removed, so that a stouter, older shell may not be so long as another which is evidently younger and has not suffered so much truncation.

Its curvature is also very variable. In its early stage of growth it is well curved, but becomes gradually, though markedly, less so as it gets older. Since the posterior end is progressively removed, the mature shell has an appearance quite different from that of the immature, being nearly straight and bluntly truncated, instead of well curved and posteriorly acuminate. The same individual in its two extreme stages of growth, without the controlling intermediate

examples, might be excusably described as distinct species. This probably partly explains why the name of *D. Bednalli*, Pilsbry & Sharp, has been added to that of *D. intercalatum*, Gould, the former being an old individual, and the latter a young one.

One shell, compared in the Natural History Museum, London, with that labelled *D. intercalatum*, Gould, was identical, and represents our immature, curved, sharp-pointed stage. The figure given in Tryon's *Man. of Conch.* corresponds with it, as does also the description there transcribed, even to the origin of its secondary riblets, first in the two interspaces on the outer curve, and somewhat later in the lateral ones and on the concave side, as italicised in the manual. Hence, though the type locality of this species is given as China Seas, the identity of our South Australian form is indisputable.

The number of ribs very rarely remains the same throughout the entire length of the shell; thus one with eleven rather acute ribs at the posterior end has but eleven at the anterior. Almost always the ribs become more numerous with age. The increase is effected in two ways, by intercalation and by rib splitting.

1. By intercalation. Generally in the centre of an interspace a riblet arises, and gradually enlarges until it equals the original ribs. The stage of growth at which this begins is variable, not only in different shells, but in the several interspaces of the same shell. For instance, when the individual is quite immature every interspace may bear a riblet, whereas when senile there may be only the first indication of one. Again, one interspace may show a riblet very soon, and later, other interspaces may develop them at varying distances as in the typical *D. intercalatum*. Besides these secondary riblets, eventually tertiary riblets may arise in their interspaces and further multiply the costations. Still another variation is to be seen—instead of a single secondary costula arising in an interspace, two riblets of equal dimensions may develop simultaneously. This twin intercalation alone may be found in an example, or there may be every combination of single and double intercalation.

2. By rib-splitting. A groove begins to form in a rib, and gradually grows in depth and width until it divides it into two. This groove may begin on the centre or on any part of the side of the rib. The ribs so formed may subsequently be cut up by other grooves. Sometimes two or three of such furrows may appear on the same rib at the same time and enlarging at an equal rate form three or four subequal riblets.

The two methods, intercalation and rib-splitting, may occur alone in respective individuals, or both in the same example, and there may be any conceivable ratio between the two methods in different specimens.

The contour of the ribs may vary greatly. They may be at their inception narrow and comparatively high, and may so continue throughout their length. Or after some increase in size they may begin to decline in height until they almost fade out and leave the anterior part of the shell nearly smooth. Their shape may completely change; whereas, at first, they may have concave interstices so as to resemble a fluted column, the ribs may widen out and become convex, while their interstices become reduced to narrow, shallow grooves between broad, approximate, rounded ribs.

The number of ribs at the posterior end is very variable. If multiplication of costæ occurs, it is plain that the older the shell and the more truncated, the greater will be the number of ribs at the posterior extremity; and if such multiplication always began at the same stage of growth and was equally rapid, the number would always be greater with a greater truncation. But such is not the case, hence the number of ribs at the hinder end varies widely. Six is the fewest I have found. But there may be any number beyond this up to fourteen, which is the most yet observed. These larger numbers are by no means restricted to examples with much truncation, nor is there any definite proportion between the number of ribs and the diameter of the shell; some of large diameter at the truncation have but few, and *vice versa*. A diagnosis framed upon the number of ribs would be baseless. Pilsbry suggests the typical form is hexagonal; probably he is right, but usually there are more than six costæ.

The anal appendical tube is wanting in most cases, even during life. When present it may be two or three millimetres long. It may exist when the shell is young and narrow, and be wanting when old and wide; possibly it may have been broken off. It is central and most frequently in the axis of the shell. But it may be distinctly out of the axis, joined at an angle so as to point markedly towards the concave side, or slightly towards the convex, and in one it is funnel-shaped instead of cylindrical. These circumstances confirm the suggestion of its being an outgrowth subsequent to truncation, and not merely a residual inner layer of the shell after the outer portion has been absorbed.

The radula (pl. xxvi., figs. 14a, b, c, d) is comparatively large, and contains fifteen rows of teeth, with the formula 1.1.1.1.1. The rachidian tooth is about twice as wide as high, is thickened along its free edge, and thinned along

its attached border. The single lateral is stout and rather short, and has one obliquely placed cusp without serrations. The marginals are trapezoidal flat plates, thickened along their inner end, and the whole or larger part of their upper margin. Mr. Kesteven, in executing the drawings, detected a small accessory plate of chitin (fig. 14d). It is somewhat pyriform, stouter at its narrow, attached end, and thinner and slightly striate at its free, expanded extremity. Its height is about one-half that of the rachidian tooth, outside of which it stands, with its base about half-way between this and the lateral. As the laterals overlap the outer fourth or third of the rachidian, this plate lies behind or between the laterals, and being comparatively thin it cannot be seen through the much denser laterals; but in a dismembered radula it can be certainly recognised.

*Cadulus acuminatus* 13 *Publ. 10/1*  
*Cadulus acuminatus*, Tate.

This shell is first referred to as a South Australian species by G. F. Angas, in a paper entitled "A List of Additional Species of Marine Mollusca . . . of South Australia," in Proc. Zool. Soc. of November 5, 1878, p. 868, species 44, *Cadulus acuminatus* (?) Desh., M.S. in coll., Cuming; Holdfast and Aldinga Bays (Tate); also Port Jackson. In the Trans. and Proc. Roy. Soc. of South Australia, vol. ix., p. 194, 1887, Tate, in a paper of October 5, 1886, on "The Scaphopods of the Older Tertiary of Australia," includes *Cadulus acuminatus*, of which he gives a short description, cites it from the "oyster beds of the Upper Aldinga series," and says, "the species is not uncommon in shell sand on the shores of St. Vincent Gulf." In the Manual of Conchology, vol. xvii., p. 183, Pilsbry gives *C. acuminatus*, Tate, pl. xxxii., figs. 47, 48, 49, with a full description.

I have dredged it in St. Vincent and Spencer Gulfs and Investigator Straits and Backstairs Passage at five fathoms, (14 dead), at nine fathoms (29 dead and 3 alive), at seventeen fathoms (80 dead and 12 alive and 7 initial tubes), besides 35 dead and 5 alive at unrecorded depths. These living examples enable me to make some additions to and alterations in Pilsbry's description of what were doubtless beach-rolled specimens. Though glossy and smooth to the naked eye, under the microscope very fine, crowded transverse scratchings are visible. Though usually quite clear and glassy, but for the white opaque internal callous ring near the posterior end, many individuals have fine, milky, transverse lines, and some have opaque, white, subdistant, interrupted bands, or on one side a group of round or oval white blotches.

The posterior end has not a continuous, smooth margin, but is irregular, and has a minute, triangular spine, which projects from it at a very slight angle on the convex border of the shell (pl. xxvi., figs. 5 and 6). This end shows signs of fracture, and suggests that it is not the actual commencement of the shell, but has been broken off from an earlier segment.

Dredged with these are what at first sight appear to be another form of *Cadulus*, or a minute *Dentalium*, measuring up to four or five millimetres in length. These are curved like a juvenile *Dentalium*, and gradually increase in diameter and become less curved. They are evidently fractured at their attenuate posterior extremity, and show a minute, triangular projection from its margin on the convex side. After a very slight inflation near their anterior extremity they are constricted, and then begin to expand again into a funnel-shaped portion, which may measure one, two, or three millimetres in length. This end is irregular in outline and evidently fractured. The funnel is clear and glassy, whereas the dentalium-shaped tube is like ground glass from very fine, crowded, transverse, milky lines. Some individuals lack the funnel, and end at the constriction.

In one instance the posterior end of a *Cadulus acuminatus* has slipped into the funnel-shaped extremity of one of these shells, and allows a comparison to be made between them.

In my opinion this dentalium-like shell is the juvenile stage of the *Cadulus acuminatus*. When it has grown to a certain length and diameter there is a trifling inflation, then it becomes definitely constricted, somewhat obliquely, and then begins to expand to form the mature shell. After a time the earlier portion becomes detached at the constriction, and in the fracture a tiny, projecting spine is left on the adult portion at the convex side, which spine is a spicule of the juvenile shell just where it is becoming contracted.

If this deduction prove correct, and I have no doubt about it, probably all the species belonging to the group *Cadulus dentalinus* represent only immature stages of species in the *C. acuminatus* group. This will necessitate a careful re-examination of all these forms, and a considerable revision of their nomenclature.

The radula, which was difficult to get because the animals were dried up, shows a formula of 1.1.1.1. Thirteen rows can be counted; possibly there may be a few more in a complete ribbon. The rachidians are higher than wide, narrower at their attached end, where they are widely notched, with a wide, simple, flange-like cusp (pl. xxvi., figs. 1a, 1b, 1c); the laterals are rhomboidal, much larger and stouter, espe-

cially at their upper inner part, and are notched at their lower inner angle to form two small cusps. The marginals are not quite so large, are rhomboidal plates, and quite simple in outline. The laterals are very different from the rather remarkably shaped denticles of *C. propinqua*, figured in Man. of Conchology, vol. xvii., pl. xxxix., fig. 11.

**Leiopyrga octona, Tate.**

Trans. Roy. Soc., S. Aust., vol. xiv., 1891, part ii., p. 260, pl. xi., fig. 5.

Dredging has supplied some living examples of this species, from which the operculum and radula have been obtained. The operculum (pl. xxvi., fig. 15) is horny and multispiral, five or six revolutions, with central nucleus. To the margin of the spirals is attached a thin membrane, rather less than half as wide as the spiral. It is radially striated with slightly wavy lines. From the earlier whorls it is absent, doubtless worn away, and is fragmentary and ragged on the next to the last whorl. The radula (pl. xxvi., figs. 16, 17, 18) has for its formula  $\infty' (5\cdot5) \infty$ . As the examples had been allowed to dry instead of being preserved in spirit, the radula was difficult to isolate, and not in perfect condition. There is a rachidian tooth nearly circular or quadrate, with a slight central projection of the free edge. Then follow five laterals on each side, with a thickened outer border, and with the free upper margin bent over throughout its whole extent. These eleven central denticles have no serrations. Then follow short, stout uncini, which gradually become longer and narrower, and finally are subulate. The number of these marginals is indefinite. They have about half a dozen minute serrations near their free end. These are not shown in fig. 18, though seen in fig. 17.

The operculum and radula of this species determine its location in the *Trochidæ*, and not in the *Turbinidæ*, and close to *Bankivia*. Fischer, Manuel de Conch., 1887, p. 810, places "Liopyrga" as a genus provisionally in the vicinity of *Phasianella* with the remark, "the operculum is unknown." Pilsbry, in Manual of Conchology, vol. xi., p. 10, 1889, makes it a section of *Bankivia*, and at p. 139 refers to "the thin, membranaceous *Trochus*-like operculum" and "the teeth like those of *Margarita*," in Watson's description of the animal of *L. picturata*, H. & A. Adams. Our species has the same characters and should have the same place. It is quite possible it should have the same name. Tate diagnoses *L. octona* from *L. picturata* by three features: its conspicuous cinguli, its convex whorls, and its linear suture. But its cinguli vary in validity; in some examples they are valid in

all the spire whorls, in others the upper whorls show them plainly, but the lower whorls very indistinctly, though in the latter they are very valid over the base of the body whorl. In some *L. picturata*, from Port Jackson, sent to me by Dr. Cox, there are quite distinct indications of spiral cinguli on the spire whorls, though in most they are wanting. Our shells vary much in the convexity of their whorls. Some with well-marked cinguli are typically convex, others equally cingulated are almost straight-sided, whereas samples of *L. picturata*, from Port Jackson, may be convex. I am disposed to think Tate's species is no more than a validly spirally striate variety of *L. picturata*, Adams.

The colouration of our shell is just as variable as that of *Bankivia fasciata*, Menke. It may be wholly white, or purple, or may be banded or spotted or flamed or blotched, or zig-zagged with pink, brown, or yellow, in very pretty and abundant variety.

Hab.—Dredged in Investigator Strait, St. Vincent Gulf, Backstairs Passage, and off Newland Head; 15 fathoms, 3 dead; 17 fathoms, 8 alive, 9 dead; 20 fathoms, 10 dead; 22 fathoms, 2 recent, 42 dead.

*Anteopholium* <sup>4M</sup> *cassidea sinuosa* sp. nov. Pl. xxvi., figs. 7, 8, 9, 10a, b, c. 533

Shell roundly oval, thin. Nucleus of two and a half whorls, smooth, flatly rounded. Spire whorls, three, rounded, with spiral liræ, 13 in the penultimate; the posterior three are linear and adjacent, the next three flatly rounded; inter-spaces, at first equal in width to liræ, but becoming gradually narrower, till reduced to shallow, wide incisions. Oblique accremental growth lines, crossing liræ and inter-spaces. Suture linear, finely crenulate. Body whorl large. Suture linear, faintly channelled towards the aperture, where it slightly ascends. Sculptured with flat, broad, slightly raised liræ, least marked over the centre of the whorl, becoming gradually more valid towards the suture, and most valid anteriorly above the notch. Numerous subdistant, axial, accremental striae, crenulating the suture, more valid and crowded towards the aperture. Aperture obliquely oval, widened anteriorly, compressed for about three millimetres posteriorly. Outer lip sinuous, projecting for about four millimetres below the suture, then receding in a shallow curve to the notch; slightly bevelled within, and faintly toothed. Some callus thickening inside the posterior projection, which is slightly incurved. Columella moderately arcuate, numerous oblique wrinkles on the lower half. Inner lip spread thickly over the varix of the notch, forming a small rhima above and below it, thinly but widely spread over the body

whorl to meet the outer lip. Notch well marked. Ornament, five spiral rows of quadrate rufous spots, one immediately below the suture, and one just above the notch, from eight to ten spots in each row. Length, 24 millimetres; breadth, 15; aperture, 16 by 7.

*Hab.*—Dredged in Investigator Strait, Backstairs Passage, and off Point Marsden, Kangaroo Island; in 15, 16, 17, 19, and 20 fathoms; 22 individuals, young and mature, alive and dead.

*Diagnosis.*—From *Cassis pila*, Reeve. It is more ovate, much less globular, and has no varix on the outer lip, which is sharp and peculiarly sinuous. From *C. Adcocki*, Sowerby. It is more elongate, has no longitudinal plicæ, the whorls are not angulated nor concave below the suture, there is no thick, granulated, infra-sutural band, there are no nodules on the last whorl, the labrum is not thickened, but is sinuous. It is not represented in the British Museum.

Its radula shows a single rachidian tooth, with a long, central cusp, and six gradually decreasing cusps on each side; a long lateral tooth, with about thirteen cusps, sloping obliquely inwards, and two uncini, not quite equal in size.

*Variety A.*—Is slightly narrower, being 19 mm. by 11, instead of 12. In place of five rows of rufous spots there are oblique, wavy, or curved brown radial bands, starting from a row of spots below the suture.

*Obs.*—The largest specimen is 27·5 mm. in length. When mature or senile there is a marginal linear thickening outside the labrum, which becomes well bevelled inside. In living specimens the ground tint is light pinkish brown, deeper on the nucleus and the earlier whorls. The number of spots in a spiral row varies considerably, even in the same shell, from 7 to 15.

### *Damararia*

*Cancellaria pergradata*. sp. nov. Pl. xxvi., fig. 19. 416

Shell small, solid, brown, fusiform. Nucleus prominent, one turn and a half, apex imbedded, smooth, light horn colour. Spire whorls, three and a half, sharply angled. Behind the angle tabulate, with one tuberculate spiral lira. At the angle a stout spiral cord, coronate with about 25 sharp tubercles. Penultimate, with four very valid spiral ribs, not quite equal in width to the interspaces (which are as deep as wide), validly tuberculate, by narrow axial striæ, running from suture to suture, very obliquely from posterior suture to angle.

Body whorl, obliquely roundly pyramidal, with ten spiral cords rounded, about half as wide as the interspaces, crossed by 26 axial lamellæ, which form rounded tubercles at the junction, and coronate the stouter cord at the angle. Finer microscopic axial striæ cross the interspaces between the lamellæ.

Aperture obliquely oblong, narrowed and deviated to the left anteriorly, where it ends in a moderate-sized notch. Posteriorly square, external lip simple, thin, corrugated by the spiral ribs, uniformly slightly curved. Columella nearly straight, with two oblique anterior plates, inner lip as a thin glaze, not obliterating the spiral ribs on the base of the whorl.

Colour, uniform dark chestnut-brown.

Length, 10 millimetres; breadth, 5. Aperture length, 4·5 mm.; width, 3.

*Hab.*—St. Vincent Gulf, 17 fathoms, 2 broken, 1 recent; Backstairs Passage, 17 fathoms, 1 alive, 3 dead; 22 fathoms, 2 dead.

LILA X  
*Stephopoma nucleogranosum*, sp. nov. Pl. xxvi., figs. 11, 12, 13.

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Shell attached, solitary, or conglomerate. Nucleus horn-coloured or white; nautiloid, of one turn and a half; diaphanous, slightly effuse at its aperture; covered with minute granules, arranged in crowded lines corresponding with the accremental lines. The shell springs from within the slightly trumpet-shaped mouth, which projects all round and marks off the embryonic shell from the next whorl. Two and a half of these follow in the same plane, rather rapidly enlarging, and attached to the surface on which the shell rests; then come one or two whorls, coiled above and adhering to those below; and, finally, a free, more or less twisted tube, varying up to an inch in length. The attached whorls along their outer under surface throw out numerous scales of attachment at irregular intervals. The adherent whorls have a pronounced rounded carina along their upper outer part, which gradually becomes less valid along the free tube, until it may be indistinguishable. From this carina the side is flat to the carina of the whorl below, so that a young shell has the shape of a short cylinder fixed by one end on the rock, etc. There are moderately developed accremental striæ, which become ruder and rounder on the free tube.

Aperture circular, or very slightly elliptical.

Colour translucent white. Some are tinged more or less with pinkish-chestnut.

Operculum horny, multispiral; nucleus central, setigerous. Setæ comparatively narrow beyond the base of attachment,

then flatly expanded with numerous (perhaps eight) fine setæ on either side, beyond these the seta bifurcates; one part continues nearly in the same axis, and is the larger and longer; the other stands out at an acute angle and generally divides into two. Resting on the operculum, in the throat of the shell, may be three or four embryos, like minute nautilus.

Cylindrical portion about 6 millimetres in diameter and 4 or 5 high; aperture 3 or 4 in diameter.

*Hab.*—Backstairs Passage, from 16 to 23 fathoms, many alive.

I compared this species with a solitary small specimen in the British Museum, of unknown habitat, said to be a type of *Vermetus senticosus*, Mörch, and regarded it as identical. But a comparison of the nucleus of our shell with the description and figure of the type of Mörch's shell, given in P.Z.S., 1861, p. 150, pl. xxv., figs. 2 and 14, disproves this. The few large tubercles of his figure are quite different from the numerous minute granules of ours, and the 25 valid mammillæ at the periphery are wanting in ours. Then the form of the opercular setæ is quite dissimilar. Ours has not the expanded, sub-basal lamina he depicts, nor has his the bifurcation which ours always shows. His description indicates his possession of several shells, and not one only. Possibly the British Museum specimen may not have been the actual individual taken as the type, though resembling it externally, but may be the species now described.

### *Asteracmea*

*Nacella crebrestriata*, sp. nov. Pl. xxvi, figs. 20, 21. 449

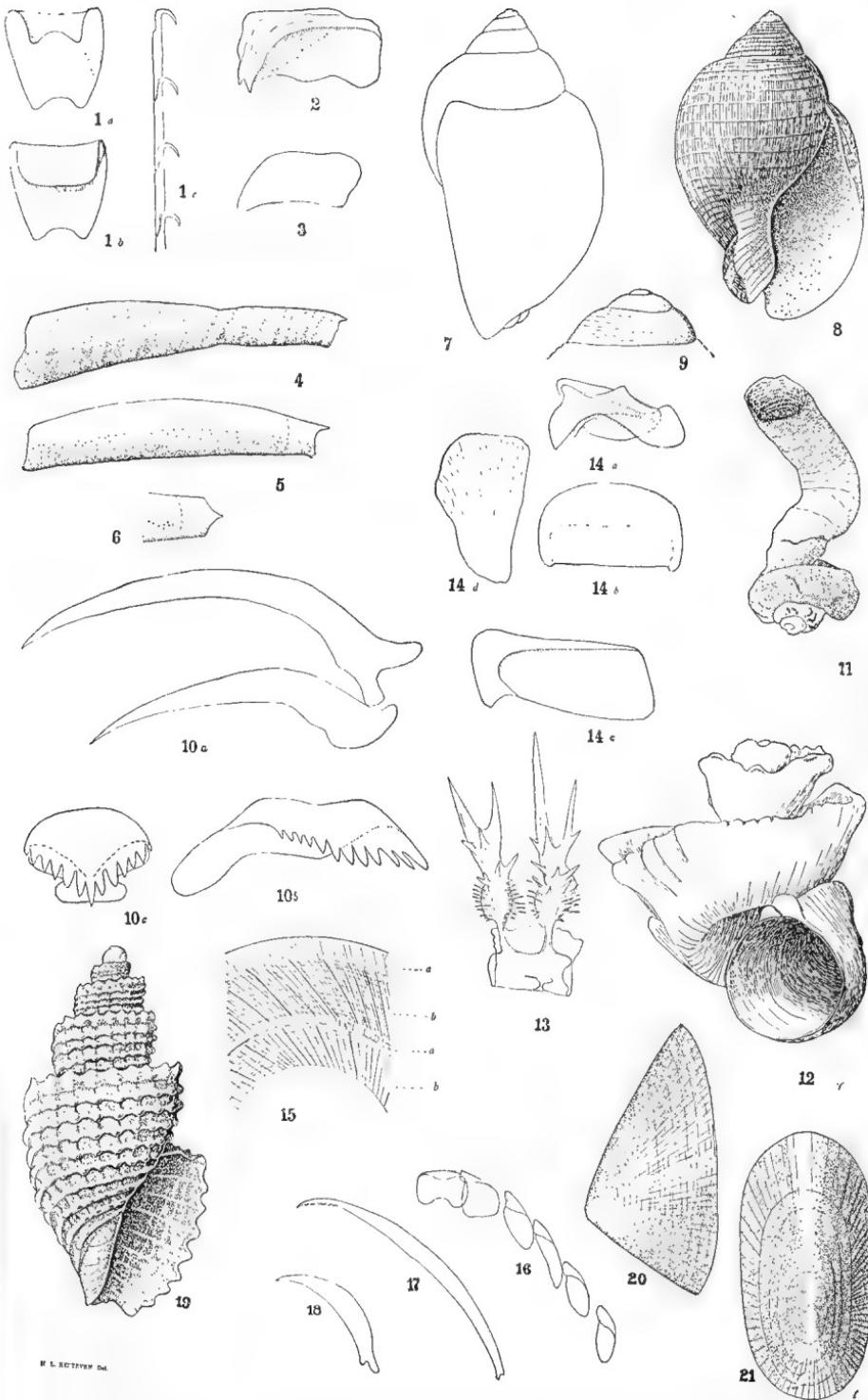
Shell oblong-ovate, laterally compressed, depressed conic. Apex subcentral, somewhat anterior; rounded, simple. About sixty radial riblets, rounded, about as wide as the inter-spaces; fine microscopic accremental striae. Translucent, with an opaque, white apex, and a white flame in the centre of the upper half of the steep anterior slope; on the posterior slope, in its upper half, is a series of about seven opaque, white, concentric markings, consecutively increasing in transverse extent. The muscle scar is open towards the shorter end of the shell. Length, 3·8 millimetres; breadth, 2·1; height, 1·8; apex, 1·1 and 2·7 from the margin.

*Hab.*—“South Australia,” from Professor Tate's collection; no more exact locality given. He had labelled it *Scutellina*; but that genus has the apex directed away from the opening of the muscle scar. Its size and shape recall our *Nacella parva*, Angas, from which it differs in being more solid and in its radial striation.

## EXPLANATION OF PLATE XXVI.

- Fig. 1a. *Cadulus acuminatus*, Tate, rachidian, from the back.  
 Fig. 1b. *Cadulus acuminatus*, Tate, rachidian, from the front.  
 Fig. 1c. *Cadulus acuminatus*, Tate, rachidians, side view; dia-  
 grammatic.  
 Fig. 2. *Cadulus acuminatus*, Tate, lateral.  
 Fig. 3. *Cadulus acuminatus*, Tate, marginal.  
 Fig. 4. *Cadulus acuminatus*, Tate, young.  
 Fig. 5. *Cadulus acuminatus*, Tate, adult.  
 Fig. 6. *Cadulus acuminatus*, Tate, adult, turned round.  
 Fig. 7. *Cassidea sinuosa*, Verco, profile.  
 Fig. 8. *Cassidea sinuosa*, Verco, ventral view.  
 Fig. 9. *Cassidea sinuosa*, Verco, protoconch.  
 Fig. 10a. *Cassidea sinuosa*, Verco, marginals.  
 Fig. 10b. *Cassidea sinuosa*, Verco, lateral.  
 Fig. 10c. *Cassidea sinuosa*, Verco, rachidian.  
 Fig. 11. *Stephopoma nucleogranosum*, Verco, adult.  
 Fig. 12. *Stephopoma nucleogranosum*, Verco, young.  
 Fig. 13. *Stephopoma nucleogranosum*, setæ from operculum.  
 Fig. 14a. *Dentalium intercalatum*, Gould, var. *Bednalli*, Pilsbry,  
 lateral.  
 Fig. 14b. *Dentalium intercalatum*, Gould, var. *Bednalli*, Pilsbry,  
 rachidian.  
 Fig. 14c. *Dentalium intercalatum*, Gould, var. *Bednalli*, Pilsbry,  
 marginal.  
 Fig. 14d. *Dentalium intercalatum*, Gould, var. *Bednalli*, Pilsbry,  
 accessory plate.  
 Fig. 15. *Liopyrga octona*, Tate, operculum. a.a. Marginal  
 fringe. b.b. Spirals.  
 Fig. 16. *Liopyrga octona*, Tate, rachidian and laterals, one  
 side.  
 Fig. 17. *Liopyrga octona*, Tate, last marginal.  
 Fig. 18. *Liopyrga octona*, Tate, first marginal.  
 Fig. 19. *Cancellaria pergradata*, Verco.  
 Fig. 20. *Nacella crebrestriata*, Verco, side view.  
 Fig. 21. *Nacella crebrestriata*, Verco, dorsal view.





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**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA, WITH  
DESCRIPTIONS OF NEW SPECIES.—PART II.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.), etc.

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[Read April 4, 1905.]

PLATE XXXI.

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**Calliostoma zietzi, spec. nov.** Pl. xxxi., figs. 1, 2, 3.

Shell small, conic, imperforate, moderately solid. Whorls 8, including protoconch of one smooth turn. First two spire whorls rounded and slightly mammillate, next three straight-sloping, last two rather convex. Suture moderately deep, slightly overhung by peripheral lira. Penultimate whorl with 6 spiral cinguli and 2 inter-liral threadlets. Body whorl with 6 cinguli, rather narrower than the interspaces, and 5 threadlets; barely angulated below its centre by a somewhat stouter cord; base rounded, with 8 concentric liræ, flat, and much wider than the interspaces. Spire and base finely obliquely incised with growth lines, which cut the liræ less than the interspaces. Aperture roundly quadrate. Columella nearly straight, slightly oblique and excavated, sub-truncate below; outer lip simple crenulated by cinguli. Height, 8 mm.; diameter of base, 5; aperture, 2·5.

*Ornament.*—Horn-coloured, peripheral band white. Main cinguli on the spire and those on the base obscurely dotted with light chestnut; peripheral band with larger and plainer spots.

*Hab.*—Backstairs Passage, St. Vincent Gulf, at 12, 17, and 20 fathoms; 9 dead.

It is named after Mr. A. Zietz, F.L.S., of the Adelaide Museum.

**Gena terminalis, spec. nov.** Pl. xxxi., figs. 4, 5.

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Shell minute thin oblong-oval, sides parallel. Whorls 4, spire terminal inconspicuous. Surface smooth and polished but for microscopic accremental lines; no spiral striæ or incisions, except microscopic, on the base of the body-whorl. Colour white, with crowded spiral bands of crestentio white and dark and reddish-brown spots and blotches. Length, 5·75 mm.; width, 3 mm. Radula,  $\infty.1.(5.1.5.).1.\infty.$ , 36 rows.

*Hab.*—Dredged alive, Wallaroo Bay, Spencer Gulf 15 fathoms; also alive and dead in deep water, St. Vincent Gulf.

*Obs.*—The ornament varies greatly. The shell may be blotched pink and white, and there may be numerous fine spiral, hair-like, dark lines.

*Diagnosis.*—From *G. strigosa*, A. Adams. It is smaller, comparatively narrower, the spire is terminal, the aperture is more oblong, the columella is straighter, the outer lip joins the columella almost at a right angle. A juvenile *G. strigosa*, equal in size to an adult *G. terminalis*, has been drawn in Plate xxxi., fig. 6, for comparison.

It very closely resembles *Gena nigra*, Quoy & Gaimard, Voy. de l'Astrolabe, Zool., Vol. iii., p. 307, Plate lxvi. (bis), figs. 10, 11, 12; but their species, as figured, has its spire less terminal, and rests more upon its two ends, and, according to the dimensions given, is three times as large.

*Gallistele* *Astele calliston*, spec. nov. Pl. xxxi., figs. 7, 8. 133

Shell conical, thin. Spire of nine whorls, including two smooth apical turns; gradated. Whorls straight-sloping, with crowded spiral liræ, about 24 on the penultimate; crossed by oblique crowded accremental striæ, producing sub-lenticular pitting. Suture linear, immediately beneath the prominent peripheral cord which gradates the spire. Body whorl with suture slightly descending at the aperture; spiral threadlets about 24; crowded fine sinuous oblique accremental striæ; periphery acutely angular, with a projecting rounded carina, spirally closely engraved on its upper surface, axially crossed by rounded striæ, much more distant than the accremental striæ, provided at somewhat irregular intervals with 16 rounded invalid tubercles. Base very flatly rounded with 7 concentric narrow liræ, the inner 4 closer than the rest, which are separated by 4 to 6 inter-lirate striæ. Umbilicus narrow, minutely axially incised. Aperture oblique, roundly quadrate; outer lip slightly convex, thin, smooth within, margin sinuously convex below the suture, concave towards the periphery; basal lip convex, slightly effuse, smooth within. Columella, upper third concave, the rest straight, obliquely truncate below; callus at the base partly bordering the umbilicus and attached to the columella along a vertical groove.

*Ornament.*—Shell purple-brown, with somewhat oblique, axial, creamy, rhomboidal flames, extending from suture to suture, and nearly equalling the foundation colour in area. On the peripheral carina, and hence above the sutures, they are replaced by two or three creamy spots, while two or three less marked white spots occupy the intervals, and thus pick out the tubercles of the carina. Every whorl is encircled by four articulated colour bands, which in the white areas are of a more opaque white than the rest of these areas, and extend slightly beyond them, and are crossed by narrow vertical or oblique red lines, while in the purple areas they are of

a deeper purple tint, and are crossed by narrow axial white lines. The base is of a lighter tint, the outer 6 cinguli of a rose pink, minutely dotted with creamy white. The columella and umbilicus are white, bordered outside with green, which tints the inner two basal cinguli, and curls around the columella into the throat. The inner edge of the outer lip is golden-brown and white, interior shining and nacreous. Operculum horny multispiral, nucleus central, a radial cellular fringe-like film over the inner three-fourths of each spiral. Height, 11.75 mm.; diameter, 9.75; aperture, 4.

*Radula*,  $\infty$ .1.5.1.5.1. $\infty$ . Central rachidian heart-shaped, narrow free end surmounted by small, slightly serrated denticle; the other rachidians with trilobed cusps, which gradually enlarge outwards; a single lateral with one cusp trilobed at its base; marginals many unicuspitate, not serrated.

*Hab.*—Spencer Gulf, 20 fathoms; 32 alive and dead.

*Variations*.—Some individuals are uniformly pinkish-brown, with white peripheral tubercles, and four pink cinguli on each whorl articulated with white, the larger white spots lying vertically between the supra-sutural tubercles, while narrower, oblique white spots alternate in groups with them.

### **Clanculus leucomphalus, spec. nov. Pl. xxxi, figs. 9, 10, 11.**

YY

Shell depressed conic, rather thin. Protoconch one turn and a half smooth. Whorls 6, rapidly increasing, sloping convex. Penultimate with 8 close-set spiral rows of smooth ovate granules. Body-whorls with ten spiral rows of granules above the acutely angled periphery, the granules of the infra-sutural row are much larger and placed axially, the rest spirally ovate; and ten rows on the base of flatter, more quadrate, and more close-set granules. Oblique axial striae crowd between the granules on the spire, but are obsolete on the base.

Aperture quadrate oblique; outer lip crenulate, toothed just within the margin opposite each spiral lira, within this thickened and wrinkled, and in the throat lirate and nacreous; basal lip crenulate, thickened within with 5 teeth gradually enlarging towards the columella; columella oblique, nearly straight, ending below in a prominent, obliquely furrowed, but not bifid tooth, with a large tubercle at the junction of its upper and middle third, and with a flange throughout its whole length bent towards the umbilicus. The umbilicus is wide and deep, with a funicle winding up its outer side to the tubercle on the columella. The umbilical border over-

hangs, and has 6 medium-sized tubercles, and is margined by a flat, axially incised, spiral lira, with a threadlet on either side.

Colour light ashen-grey, with obscure flames of deeper grey or buff, and with numerous small pink dots on the second and third whorls. The umbilicus and its margin are pure white, the throat nacreous green.

Height, 8 mm.; diameter of base, 9·75 mm.

*Hab.*—Backstairs Passage, St. Vincent Gulf; dredged alive in 20, 22, 23 fathoms, dead in 6 to 23 fathoms.

*Diagnosis.*—The type from Gray's collection of *Trochus clangulus*, Wood, in the Natural History Museum, London, differs from our species in having a more sinuous columella, due to a large tubercle at each end, and a median bulge, only 6 liræ on the penultimate whorl, stouter and fewer liræ in the throat, a less rounded periphery, its colour light pink, with pink spots on the base, and articulated deep pink just above and below the suture, and green and red tints instead of light ashen-grey with darker buff flammules.

### *Crassatellites ponderosus*, Gmelin.

This is the name suggested by Mr. Hedley, in P.R.S. of N.S.W., 1904, Part 1, page 198, for *C. castanea*, Reeve, as also for *C. kingicola*, Lamk.; *C. donacina*, Lamk.; *C. decipiens*, Reeve; *C. errones*, Reeve; *C. pulchra*, Reeve; and *C. cumingi*, A. Adams, which E. A. Smith and Brazier had previously united under the name of *C. kingicola*, Lamk. Gmelin's shell, which was first defined in pre-Linnean times by Chemnitz, is cited by von Martens in Malak. Blat. xix., 1872, page 30, as from New Guinea. In Syst. Naturae, C. Linné, vi. Vermes, page 3280, it is given as *Venus ponderosa*, No. 54, as inhabiting the Southern Ocean.

Some 40 specimens have been dredged by me in South Australian waters, of which 26 are single valves. Living individuals were found at 20 fathoms, off Normanville, at 19 fathoms off Eastern Cove, Kangaroo Island, and at 15 fathoms off Wallaroo. These form the material on which the following observations were based.

All the species above-named, except *C. castanea*, are validly corrugated by sub-distant concentric ribs. Not one of my forty examples is so corrugated. It is, therefore, least like *C. kingicola*, Lamk. But I only possess one cabinet specimen of each of them. Perhaps a large series would show examples with smooth surfaces near the umbos.

*Size.*—The largest measures 115 mm. antero-posteriorly, 90 mm. umbo-ventrally, and 49 mm. in section, and weighs ten ounces.

*Shape.*—This varies a good deal, as is noted in Conch. Cab., Band x., Abtheil i., page 2; Taf. i., fig. 1; Taf. vi., fig. 1, 1886, where two figures are given, one of a shell 88 mm. by 75 by 42, and another much produced posteriorly, 98 by 73 by 50. One from Port Lincoln, a rounded form, is 112 mm. by 93, while another very produced behind is 115 mm. by 90. This is not merely a senile tendency, for the difference in contour is found in young shells, and also in those of equal size and apparently of similar age. In the produced individuals the ventral outline, instead of being uniformly convex as far as the postero-inferior angle, may be somewhat concave in front of this.

*Thickness.*—It is very solid; the heaviest shell we have on our coast; it may weigh 10·75 ounces. Often growth in superficial area ceases after a time, and then the thickness greatly increases. Thus a shell only 3·7 inches long and 3·1 deep is 2·05 in section, and weighs 10·75 ounces, whereas another 4·25 inches long and 3·5 deep is only 1·9 inches in section, and weighs but 8 ounces. The volume of the contained mollusc actually diminishes, the thickening taking place at its expense. The muscular impressions appear deeply excavated then, owing to the heaping up of shelly material around the adductor muscles beneath the mantle. The ventral margin, instead of being sharp, is flattened for as much as an inch, nearly at right angles to the external surface, and is in some cases even incurved.

*Periostracum.*—This is very durable, and even in dead and decaying valves is frequently present, and allows very fair cabinet specimens to be prepared from very unpromising material by a little careful scraping. It disappears sometimes first at the umbos and the subjacent surface, then erodes deeply. My largest individual, taken alive, has only a little of its epidermis remaining along the ventral and posterior borders, and its face value has been thus greatly depreciated.

*Interior.*—This is smooth down to the pallial line, which is slightly crinkled, and thence on there are radial striae which fade out towards the ventral margin. The older the shell the deeper is the pallial line, and wider posteriorly, and more markedly crinkled, and the more rugose become the radial striae beyond.

*Colour.*—The interior is white, with a beautiful glistening chestnut or burnt-umber colouring of certain parts. The frequency and depth of tinting of these parts is in the following order:—The posterior adductor scar, the posterior part of the pallial line, the anterior portion of the anterior adductor scar, the posterior margin, the ventral margin, and the posterior part of the cartilage pit and hinge plate. Some-

times the colour is a very deep, almost blackish-brown, with a delicate flesh tint, and one is tinted a pretty purplish-pink.

**Carinaria australis**, Quoy & Gaimard.

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Quoy & Gaimard, Voy. de l'Astrolabe, Zool., vol. ii., page 394, Pl. xxix., figs. 9, 13, 1833. The type specimen was dredged between New Holland and New Zealand in January, 1827. Mr. Hedley supplied me with the following quotation from Voy. de l'Astrolabe, Histoire du Voyage ii., 1830, page 27:—"January 2, 1827, the zoologists collected some living carinarias, the shells of which attained a length of eight to ten lines." The next day the vessel was 130 leagues from Port Jackson, on the way to Cook's Straits, New Zealand. Allowing about a hundred to a hundred and fifty miles for the day's run, we can fix the locality of the haul of *Carinarias* at about 158° E. longitude and 40° S. latitude. My single specimen was taken in January, 1905, in 104 fathoms, in sandy ooze, 35 miles south-west of the Neptune Islands, below the entrance to Spencer Gulf, in E. longitude 135° 40', and S. latitude 35° 25'. So its habitat is extended some 22 or 23 degrees to the west. It measures 10 mm. in length and 3.75 in width. Several characters can be added to those given by the authors. The transverse ridges spreading fan-like from the posterior part to the carina increase in number by intercalation of secondary and tertiary ridges. The carina is undulated in its proximal part, where it springs from the shell, but its distal edge is straight, not corrugated, and only at the back part, where the distal border has been worn or broken away, is it actually undulated at the margin. The aperture is oval, and is about twice as wide towards the posterior part as at the anterior. From within a portion of the protoconch can be seen projecting through the posterior wall of the shell somewhat obliquely and slightly to the right of the middle line. The record of this shell adds not only a new species and a new genus to the South Australian list of marine molluscs, but a new order of Gasteropods; the Nucleobranchiata. *Atlanta*, another genus of this order, is also represented by an undetermined species taken in the same haul.

**Gibbula lehmanni**, Menke.

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*Turbo lehmanni*, Menke, Moll. Nov. Holl., page 18; *Trochus lehmanni*, Philippi, Conchyl. Cab. Band ii., Abth. iii., page 185, t. 28, fig. 15; Fischer, Coq. Viv., page 362, t. iii., fig. 3; *Gibbula pulchra*, A. Ads. P.Z.S., 1851, page 187; *Gibbula lehmanni*, Menke, Tryon, Man. of Conch. xi., page 233, Plate xl., figs. 12, 13.

This is a fairly common species. It has been dredged alive at 14 and 25 fathoms in Spencer Gulf, and dead at 15

fathoms in Wallaroo Bay. It has hitherto been confused in South Australia with *G. Coxii*, Angas, so I give the following diagnostic characters:—*G. Coxii* is more solid, slightly less depressed, rather more concave between the carinæ, with sharper spiral liræ, and a much smaller umbilicus. This last character is the easiest diagnostic. The radial flames are much fewer, the colour elsewhere is irregularly stippled instead of spirally articulated, and there are fewer colours in the same shell. Mr. J. H. Gatliff has sent me this shell as *G. sulcosa*, A. Adams, P.Z.S., 1851, page 186, recorded in his Catalogue of the Marine Shells of Victoria, P.R. Soc. of Vict. xiv. (N.S.), Part ii., 1902, page 132. Adams's name is given in Tryon's Man. of Conch. xi., page 243, "unfigured and undetermined species," with the *habitat*, Sir C. Hardy's Island, North Australia.

### Astele subcarinatum, Swainson.

*Astele subcarinatum*, Swns., 1854, P.R.S., Van Diemen's Land, vol. iii., page 36, Plate vi., figs. 1, 2; *Eutrochus perspectivus*, A. Adams, P.Z.S., Lond., 1863, page 506; *Calliostoma (Eutrochus) Adamsii*, Pilsbry., Man. Conch. xi., page 402.

It has been dredged alive at 16, 19, 20, 22, 23 fathoms, in Backstairs Passage, and off Newland Head.

*Zizyphinus subgranularis*, Dunker, Malak. Blätt., 1871, page 170, No. 56, unfigured, from Bass Straits; *C. subgranulum*, Dunker, Man. Conch. xi., page 403, is a half-grown individual of the same species. This identification was referred to Mr. Hedley, who says he had arrived at the same conclusion.

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### EXPLANATION OF PLATE.

#### PLATE XXXI.

Figs. 1, 2, and 3. *Calliostoma zietzi*, Verco—Basal and profile views, and magnified sculpture.

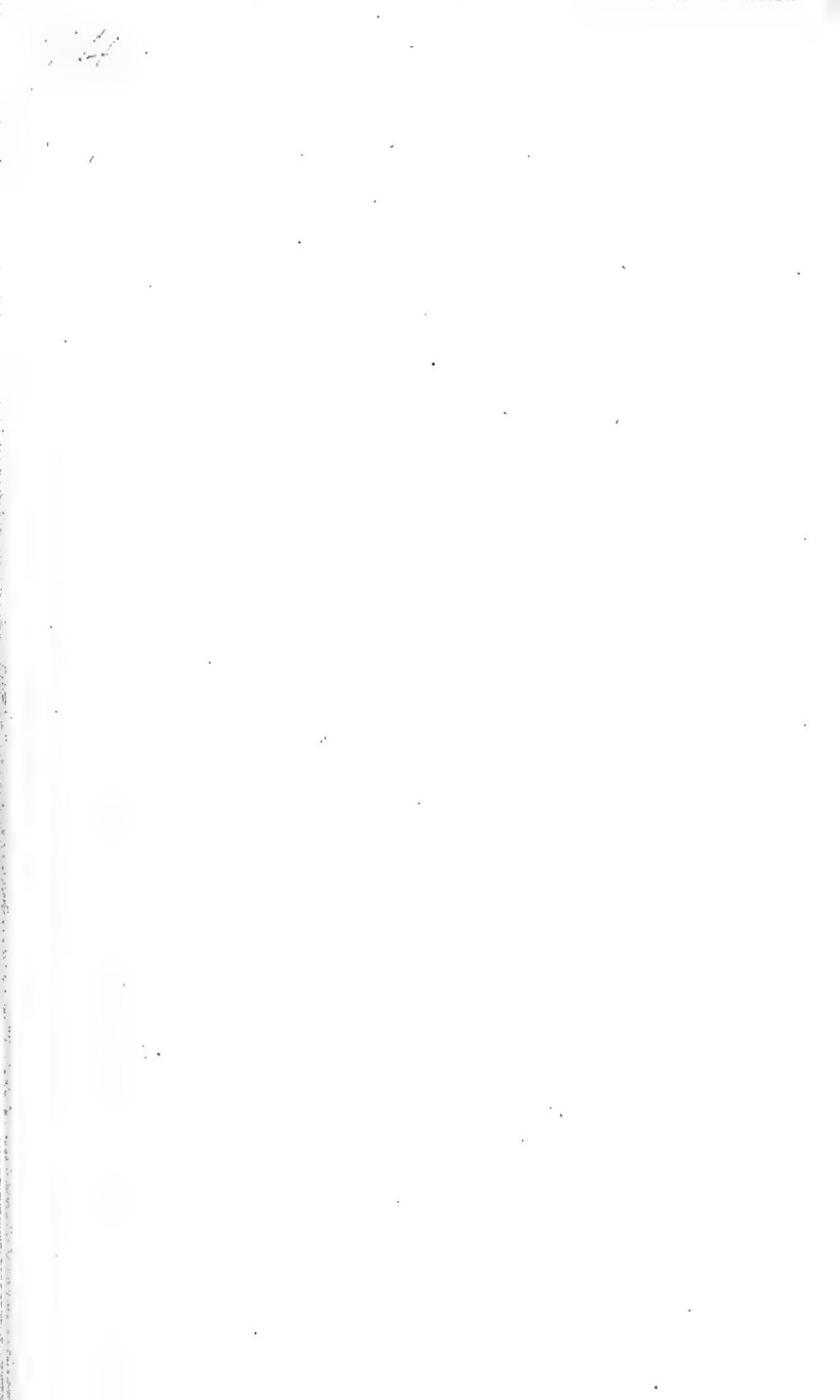
Figs 4 and 5. *Gena terminalis*, Verco.

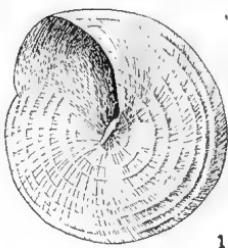
Fig. 6. *Gena nigra*, Quoy & Gaimard.

Figs. 7 and 8. *Astele calliston*, Verco.

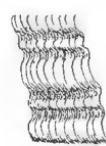
Figs. 9, 10, and 11. *Clanculus leucomphalus*, Verco.

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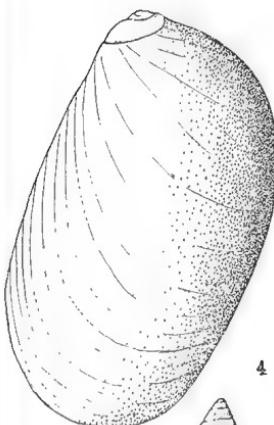
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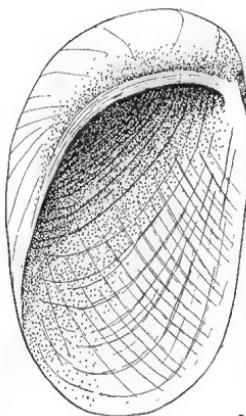
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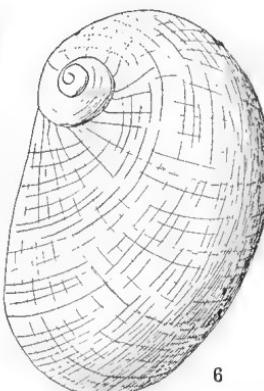
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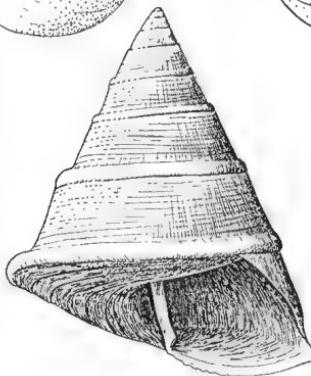
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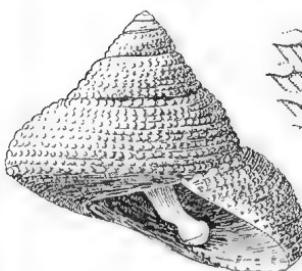
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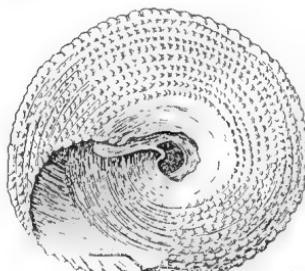
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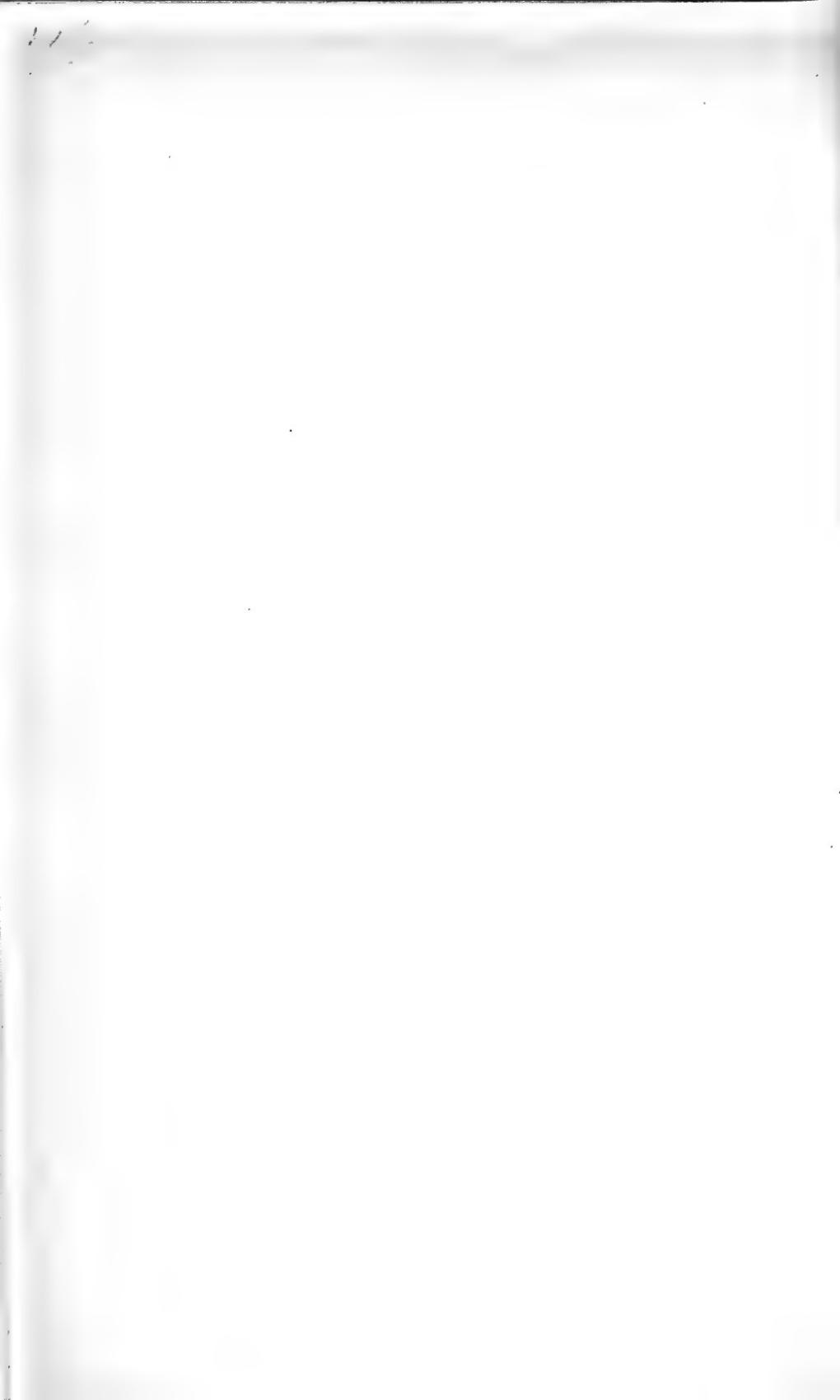


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H. L. Kesteven, del



**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA, WITH  
DESCRIPTIONS OF NEW SPECIES.—PART III.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.), etc.

[From "Transactions of the Royal Society of South Australia,"  
vol. xxx., 1906.]

[Read May 1, 1906.]

PLATE IV.

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**Cingulina spina**, Crosse and Fischer.

*Turritella spina*, Crosse and Fischer, Journ. de Conch., 1864, p. 347; 1865, p. 44, t. 3, figs. 12-14, type locality, St. Vincent Gulf; *Aelis tristriata*, Ten. Woods, Proc. Roy. Soc. Tasm., 1877, p. 150; type locality, N.W. Coast, Tasmania; No. 220, Handlist of Aquatic Moll. of S. Aust., Adcock, 1893.

This species varies greatly. It may be very attenuate, or comparatively wide; uniformly subulate or posteriorly spindle-shaped; have valid or obsolete axial striae; a smooth base, or with numerous sublenticular spiral grooves, or two slight spiral undulations. The last whorl may be very ventricose. A more or less valid lira may lie in the suture. The cinguli are usually nearly equal, but the central one may be more developed, and the suture be wide and deep and distinct.

**Cingulina diaphana**, spec. nov. Pl. iv., fig. 11. 483

Shell thin, diaphanous. Protoconch asymmetrical smooth. Whorls exclusive of this six, medially carinate, with seven valid spiral liræ, equally distant on the penultimate, scabrous from microscopic accremental striae, obliquely receding from the suture. Suture well marked, slightly channelled. Body-whorl with a stouter lira at the periphery, and a deeper sulcus below it, and seven basal liræ less valid than those above, base sloping. Aperture fusiformly lozenge-shaped, slightly contracted behind, and narrowly effuse in front. Outer-lip simple. Columella slightly convex posteriorly uniformly concave throughout the anterior three-fourths; inner-lip complete.

Length, 2·1 mm.; breadth, ·7 mm.; aperture, ·6 mm.

Hab.—Henley Beach, one example in the late Prof. Tate's collection, labelled "Mathilda pagodula." One other specimen dredged in deep water St. Vincent Gulf.

*Scalaria aculeata* godfreyi Sowerby, jun. 390

*Scalaria aculeata*, Sowerby, Proc. Zool. Soc. Lond., 1844, p. 12; Thes. Conch., vol. i., p. 86, sp. 13, pl. xxxii., figs. 35, 36, 37, 1847; Tryon, Man. Conch., vol. ix., p. 63, pl. xiii., figs. 90, 91, 1887; No. 192, Handlist of Aquatic Moll. of S. Aust., 1893; S.

*aculeata*, Lamarck, 1819; in Tate and May's Tasmanian Census, Proc. Lin. Soc. of N.S.W., 1901, pt. 3, p. 379.

It ranges alive from the shore (Henley Beach, "with a purple mucus," A. Zietz), to 12 fathoms Porpoise Head, and 22 fathoms Backstairs Passage; and dead in perfect condition in 104 fathoms 35 miles S.W. of Neptune Islands.

*Scala jukesiana*, Forbes. *delicatula* 380

*Scalaria jukesiana*, Forbes, appendix to Voy. of "Rattlesnake," vol. ii., p. 383, t. 3, f. 7, 1852; Tryon, Man. Conch., vol. ix., p. 66, pl. xiv., f. 20, 1887; No. 194, Handlist of Aq. Moll., Adcock, 1893. *Scalaria delicatula*, Crosse and Fischer, Journ. de Conch., 1864, p. 347; 1865, p. 42, t. 3, f. 9, 10; type locality, St. Vincent Gulf, S. Aust.; Tryon, Man. Conch ix., p. 69, pl. 14, f. 39, 1887; habitat, New Caledonia.

Tryon defines it as "very minutely spirally striated," but Crosse says "the intervals between the ribs are smooth." No fine spiral lines could be detected by me on the two shells in the British Museum, labelled "*S. delicatula*, Cr. and F., S. Aust., G. F. Angas," on the back of the tablet being "*S. aust.* and New Zealand. Type."

Pritchard and Gatliff, in Cat. of Marine Shells of Victoria, Proc. Roy. Soc. of Vict., 1900, vol. xiii. (N.S.) pt. i., p. 143, give *S. censors*, Crosse and Fischer, Journ. de Conch., 1864, p. 347; 1865, p. 43, pl. iii., f. 11, 12, as a synonym; but the type shell in the Brit. Mus. shows a well-marked peripheral keel, which none of our *S. aust.* *jukesiana* possesses.

*Scala friabilis*, Sowerby, jun.

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*Scalaria friabilis*, Sow., Proc. Zool. Soc., Lond., 1844, p. 27; Thes. Conch., vol. i., p. 95, sp. 47, pl. xxxiv., f. 47, 1847; Tryon, Man. Conch., vol. 9, p. 61, f. 75, 1887; No. 193, Handlist Aq. Moll., Adcock, 1893.

On the tablet in the Brit. Mus. is "Swan River, Australia, on the sands, unique, Dr. Collie, type." Our shells are identical with this; but one measures 22 mm., i.e., 6 mm. longer than the type. Porpoise Head, 12 fathoms, 2 recent, 2 dead; Backstairs Passage, 20 fathoms, 1 recent.

*Scala rubrolineata*, Sowerby, jun.

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*Scalaria rubrolineata*, Sow., Thes. Conch., vol. i., p. 91, sp. 33, pl. xxxiv., f. 83, 84, 1847; Tryon, Man. Conch., vol. ix., p. 60, pl. xii., f. 82-83, 1887.

This species, misidentified, was listed in Handlist of Aq. Moll. of S. Aust., Adcock, 1893, as No. 195, *S. imperialis*, Sby. It is very rare. The Levens Beach, Spencer Gulf (W. T. Bed-nall); St. Vincent Gulf (D. J. Adcock).

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~~**Scala zelebori, Dunker.**~~

*Scalaria zelebori*, Dunker, Verhandl. Zool. Bot., Gesell., Wien, 1866, vol. xvi., p. 912. *Scalaria zelebori*, Frauenfeld, Reise, Fregatte Novara, vol. ii., pt. 3, p. 7, t. i., f. 6, 1868; Tryon, Man. Conch., vol. ix., p. 78, pl. 15, f. 75, 1887; Handlist of Aq. Moll. of S. Aust., Adcock, 1893, No. 199.

This is recorded for S. Aust. by Tate, from a single individual given to him by Mr. Pulleine, from Encounter Bay. No other collector has taken it, nor has it been found in Tasmania or Victoria. Probably it does not occur here.

~~**Scala platypleura, spec. nov.**~~ Pl. iv., fig. 6. 396

Shell moderately solid, whorls 8, increasing rapidly. Protoconch two whorls, smooth, convex. Whorls well rounded. Suture deep, simple. Varices running forward below, solid, rather low, doubly flanged so that a free edge projects slightly on either side, edges minutely cut, surface slightly irregular, subangular below the suture, 15 on the body-whorl. Aperture roundly quadrate, with an oblique gutter at the base of the columella.

*Sculpture*.—Obsolete subdistant spiral incisions mounting the varices.

Length, 5 mm.; spine, 2·6 mm.; width, 2·3 mm.

*Hab.*.—Backstairs Passage 22 fathoms, 2 dead. Type in Dr. Verco's collection.

⌚ The second shell is rather thinner, and its varices are not quite so solid.

*Diagnosis*.—From *S. zelebori*, Frnfd., its nearest ally, it is distinguished by more numerous varices, and its incisions, which are quite different from the more distant spiral liræ of the N.Z. form. It differs from *S. jukesiana*, Forbes, in the more rapid increase of its whorls, its fewer and much more solid varices, which also run forward and downwards instead of backward.

~~**Scala acanthopleura, spec. nov.**~~ Pl. iv., fig. 8. 395

Shell rather solid, whorls 8, rapidly increasing. Protoconch conical, smooth, sharp, 3 whorls, homostrophe. Varices solid, half the width of the interspaces, numerous, 20 on the body-whorl, tuberculate, 4 tubercles or prickles on the penultimate, 7 on the body-whorl, microscopically axially striate. Interstices very minutely closely spirally lirate, liræ mounting the varices. Aperture round, with a shallow gutter at the junction of the basal lip and the columella, which is thus slightly twisted and toothed. The varices wind round the columella as 7 oblique plaits ceasing at the inner lip, which here is thin and erect.

Length, 4·1 mm.; spire, 2·6 mm.; width, 2·6 mm.

*Hab.*—104 fathoms, 35 miles S.W. of Neptune Islands, 5 dead.

Type in Dr. Verco's collection.

**Scala crassilabrum**, Sowerby, jun.

*Scalaria crassilabrum*, Sow., jun., Thes. Conch., vol. i., p. 105, p. 87, pl. xxxv., figs. 115, 116, 1847; Tryon, Man. Conch., vol. ix., p. 82, pl. 17, f. 32, 1887.

The localities given are the Philippines and Central America, and, though the regions are remote, our shell answers to the description and figures. Dredged in deep water, St. Vincent Gulf. One example, measuring 12·75 mm. by 3·5 mm.

**Scala granosa**, Quoy.

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*Turritella granosa*, Quoy, Zool. Voy. Astrolabe, vol. iii., p. 138, t. 55, f. 29, 30; *Scalaria granulosa*, Quoy, Tryon, Man. Conch., vol. ix., p. 80, pl. xvi., f. 11, 1887; No. 198, Handlist of Aq. Moll. of S. Aust., Adcock, 1893; *Scalaria ballinensis*, E. A. Smith, Ann. Mag. Nat. Hist. (6), vii., 1891, p. 139, only a smooth form, teste Hedley, Proc. Lin. Soc. N.S.W., 1901, pt. iv., p. 701, pl. xxxi., f. 21.

Taken alive at Encounter Bay, in crevices of rocks (Dr. Perks). It must be a very littoral species, as no example has been dredged by me.

*translucida?*  
**Scala australis**, Lamarck.

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*Scalaria australis*, Lam. Anim. s. Vert., 2nd edit., vol. vi., p. 228, sp. 6, 1843; Delessert Recueil, t. 33, f. 11; Thes. Conch., p. 103, sp. 82, pl. xxxv., f. 185, 1847; Tryon Man. Conch., vol. ix., p. 76, pl. xvi., f. 90, 1887; No. 197 Handlist of Aq. Moll. of S. Aust., Adcock. *Hab.* "the Seas of New Holland."—M. Macleay."

Taken alive on the beach at Corny Point, Spencer Gulf (Dr. Perks), and Middleton (D. J. Adcock). It must be very limited in its range as regards depth, for I have not taken a single individual alive or dead by dredging.

**Scala consors**, Crosse and Fischer.

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*Scalaria consors*, Crosse and Fischer, Journ. de Conch., vol. xii., 1864, p. 347; xiii., 1865, p. 43, pl. 3, figs. 11, 12; Tryon, Man. Conch., vol. ix., p. 74, pl. 13, f. 11, 1887; No. 196, Handlist of Aq. Moll. of S. Aust., Adcock, 1893. Type locality, St. Vincent Gulf, S. Aust.

In the Brit. Mus. the tablet has on its face, "*S. consors*, Cr. and Fischer, Ceylon, G. F. Angas," and on its back, "Type." It has a peripheral keel. Mr. J. C. Melville cites it from Bombay, and refers it to *perplexa*, Pease. I have a note without any reference. "Angas sent shells from S. Aust. to Crosse, for description, and among them were *S. delicatula*

and *S. consors*, their habitat being given as St. Vincent Gulf; and then sent the type of *S. consors* to the Brit. Mus. as from Ceylon." No shell answering to its description has been found in S. Aust.

**Scala valida, spec. nov.** Pl. iv., fig. 7. *385*

Shell elongate, imperforate, 9 whorls. Protoconch conspicuous, submammillate,  $1\frac{3}{4}$  whorls, at first smooth, then with gradually developing axial costæ; it ends abruptly with a faintly averted edge, and is followed by spirally striated sculpture. Spire-whorls uniformly convex. Suture deep, subcanaliculate. Body-whorl convex, with a bold, square, subtuberculate peripheral rib; base somewhat concave. Aperture slightly oblique, roundly oval, faintly flattened anteriorly; border well defined, smooth, and flat; at the base its outer margin is not curved, but straight. Varices 12, slightly advanced at the upper suture.

*Sculpture*.—Axial ribs, 18 in the body-whorl, about as wide as the interspaces, prominent, round, tapering at each end, terminating at the peripheral rib, which widens to meet them, and so becomes undulatingly tuberculate. Spiral liræ 12 on the body-whorl above the periphery crossing the costæ and extending to the aperture: 7 spiral liræ on the base increasing in width towards the axis. The interstices between all liræ spiral and basal and the edges of the peripheral rib are punctate.

*Ornament*.—The shell is whitish. Three obscure spiral light-brown bands, one tinging the peripheral rib, one just below the centre of the whorls, and one midway between this and the upper suture. The last band is chiefly represented by a small brown blotch on the rib behind each variceal costa.

Length, 6·4 mm.; spire, 2·7 mm.; aperture, including the rim, 1·6 mm.; width, 2·3 mm.

*Hab*.—Backstairs Passage, deep water, 6 recent, none alive.

Type in Dr. Verco's collection.

*Variations*.—The spiral liræ may be only 9 or may be 17. One shell is 6·9 mm. in length, with 9 whorls.

**Scala morchi, Angas.**

*Scala (Cirsotrema) morchi*, n. sp., Proc. Zool. Soc., Lond., 1871, Jan. 3, p. 15, pl. i., f. 7; type locality, Port Jackson; op. cit., 1871, Jan. 17, p. 90, sp. 23; Tryon, Man. Conch., vol. ix., 1887, p. 82, pl. 16, f. 7.

Some twelve examples of this shell have been dredged by me in the deeper waters of St. Vincent and Spencer Gulf, and one at 104 fathoms, 35 miles south-west of the Neptune

Islands. In the British Museum is one shell labelled, "*S. morchi*, Angas; Port Jackson, G. F. Angas"; it is not affirmed to be a type; but it quite agrees with Angas's description. The axial and spiral ribs and ridges are of about equal prominence, and there is no peripheral rib. There are varices at irregular intervals which run downwards and backwards on the spire; these are not noted in the definition of the type. It recalls the *S. suturalis*, Hinds; but this has a valid peripheral rib, which appears as a lira in the suture, and its axial costæ are more marked, and it is a larger shell, being eight lines in length, with ten whorls, instead of five lines with nine whorls. Our *S. Aust.* examples vary very greatly. First the peripheral rib is quite valid, and the axial costæ end abruptly upon it, and the base has only spiral liræ. In one this just appears in the suture as a lira. In others this rib is less and less marked, and may be quite absent. The axial costæ also differ in validity, much surpassing the spiral ridges, or equaling them, or being less prominent; they may end at the peripheral rib, or extend beyond the periphery, and gradually fade out on the base. The spiral ridges may vary in number and in size and in the degree to which they modify the axial costæ. But all have the irregular varices and a minute punctate surface.

These considerations suggest the identity of *S. morchi*, Angas, with *S. suturalis*, Hinds. I do not know whether the latter has the punctate sculpture, and as it is a much larger shell, and comes from a remote region, this is left *sub judice*. Whether *S. valida*, Verco, and *S. invalida*, Verco, will also come within the specific definition of *S. morchi*, Angas, must be left until more material is gathered; at present intermediate forms are wanting. One example of *S. morchi* supplied an operculum, figured on pl. iv., figs. 1, 2, which is similar to that of *S. aculeata*, Low., and tends to confirm the generic position of this rather atypical Scala.

**Scala invalida, spec. nov.** Pl. iv., figs. 9, 10. 388

Shell rather thin, translucent, elongate, imperforate, 11 whorls. Protoconch deflected, 2 whorls, nearly smooth; the first round, the second angulate just above its centre, and ending in a varix. Spire whorls 8, regularly convex; suture deep, simple. Body-whorl round with the merest peripheral angulation. Aperture subrotund, flattened by the base of the body-whorl, margin thickened externally.

**Sculpture.**—Very crowded, fine axial and spiral liræ, punctating the whole surface. The axial liræ vary somewhat in thickness; they continue over the base and the callus of the aperture, so as to reach nearly to its inner margin, leav-

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ing only a narrow rim smooth. Deep in the suture are tubercles on the upper border of each whorl, about 24 on the body-whorl. Varices at irregular intervals, one on the second whorl, one on the fifth, and one at the aperture. They curve forwards towards the upper suture.

Length, 10·4 mm.; breadth, 3 mm.; body-whorl, 3·5 mm.

*Hab.*—St. Vincent Gulf, deep water, one recent.

*Obs.*—This species may prove to be an extreme variant of *S. morchi*, Angas, in which the radial and spiral costæ have been suppressed or reduced to punctuating lirellæ.

***Scala (acrilia) minutula*, Tate and May.**

*Scalaria (acrilia) minutula*, Tate and May, Proc. Roy. Soc. of S. Aust., xxiv., 1900, p. 95; Proc. Linn. Soc. N.S.W., 1901, pt. 3, p. 379, pl. xxv., fig. 41; type locality, Tasmania; type in Hobart Museum.

*Hab.*—Fowler's Bay (R. Tate), St. Vincent Gulf.

***Crossea*, A. Adams.**

***POLYCROSSEA labiata*, Ten.-Woods.**

~~861~~ *Crossea labiata*, Ten-Woods, Proc. Roy. Soc., Tasm., 1878, p. 151; type locality, Long Bay, Tasm.; No. 200 in Handlist Aq. Moll. of S. Aust., Adcock, 1893; Hedley, Proc. Linn. Soc. N.S.W., 1900, p. 500, pl. xxvi., f. 18; Tate and May, Census of Marine Moll. of Tasm., Proc. Linn. Soc., N.S.W., 1901, pt. 3, p. 379.

Dredged dead St. Vincent Gulf 9 and 5 fathoms (Verco), Beach Holdfast Bay, Aldinga, West Coast (R. Tate).

~~Crosseola~~ ***Crossea concinna*, Angas.**

Proc. Zool. Soc., Lond., 1867, p. 911, t. 44, f. 14; Tryon, Man. Conch., ix., p. 85, pl. 17, f. 45, 1887; Tate and May in Census of Marine Moll. of Tasm., Proc. Linn. Soc., N.S.W., 1901, pt. 3, p. 380; Conchyl. Cab., Mart. and Chemn, Bd. 1, Abt. 28, p. 261, t. 41, f. 10, 1902.

Dredged dead St. Vincent Gulf and Backstairs Passage, 17 fathoms, 7 dead.

~~Crosseola~~ ***Crossea cancellata*, Ten.-Woods.**

Proc. Roy. Soc., Tasm., 1878, p. 122. Type locality, Blackman's Bay, Tasm. *Delphinula johnstoni*, Beddome, Proc. Roy. Soc., Tasm., 1882, p. 31, and 1883, p. 169; *Crosseia cancellata*, Ten-Woods, Tate and May, Census Marine Moll. Tasm., Proc. Linn. Soc., N.S.W. 1901, pt. 3, p. 381, pl. xxiii., fig. 1.

Dredged off Newland Head, 20 fathoms, 5 dead.

~~Ecomilus~~ ***Terebra dyscritos*.** Pl. iv., figs. 3, 4, 5. ~~80~~ 80

Shell solid, long, narrow. Whorls 7. Protoconch  $\frac{1}{2}$  whorls, homostrophe, convex, with 20 fine spiral incisions ending abruptly in a varix, white. Spire whorls with angulation at one-fourth the distance from the lower suture; uni-

formly concave between the angulations; with axial costæ, valid, rounded nearly as wide as the interspaces, and spiral liræ, wider anteriorly, wider than their interspaces, crossing the costæ, six above the angulation, and two below it; fine accremental striae under the lens. Suture distinct, linear, undulating, convex between the costæ. Body-whorl oblong with two median rounded carinæ, the upper larger, more prominent, forming the angulation (in the spire whorls), the lower producing the upper margin of the suture, tuberculated by the axial costæ, which cease at the lower one; six spiral liræ above them, two between them, and ten of varying size below them on the concave base. Aperture subtriangular, outer side straight, inner sigmoid. Outer lip thin, slightly excavated just below the suture for one-sixth of its extent to form a shallow sulcus, with a margin feebly thickened and everted, then excavated again to the upper carina, an acute short projection between the two excavations; edge crenulated by spiral liræ and carinæ. Basal lip begins at the lower carina and is concavo-convex to the anterior notch. Columella concavo-convex from behind forwards.

*Dimensions*.—Length, 9·1 mm.; width, 2·7 mm.; aperture, 2·8 mm.; body-whorl, 4·8 mm.

Locality of type, St. Vincent Gulf, 22 fathoms with 6 other examples, 100 fathoms off Beachport, one broken, 110 fathoms 6, 130 fathoms off Cape Jaffa, 2 broken.

*Ornament*.—The type is white, but a co-type shows a brown tinting of the two carinæ and of that part of the axial costæ connecting them, most marked at the tubercles of junction. This shell is 10·1 mm. long, and shows fifteen spiral liræ at the base.

*Observations*.—The living mollusc has not been taken, so the radula and the operculum (if any) are not known. Its generic position is very doubtful, and even its family is questionable. Some conchologists who have seen it refer it with doubt to the *Terebridae*, and propose the creation of a new genus for its reception. Its infra-sutural sulcus, barely thickened at the margin, suggests *Pleurotomidae*, but it is difficult to find a genus for it here.

#### EXPLANATION OF PLATE IV.

- Fig. 1, 2, Operculum of *Scala morchi*, Angas.
- " 3, 4, 5, ? *Terebra dyscritos*.
- " 6, *Scala platyleura*, n. sp., Verco.
- " 7, " *valida*, n. sp., Verco.
- " 8, " *acanthopleura*, n. sp., Verco.
- " 9, 10, " *invalida*, n. sp., Verco.
- " 11, *Cingulina diaphana*, n. sp., Verco.



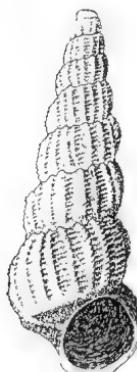
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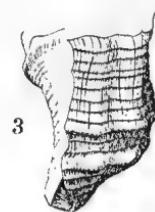
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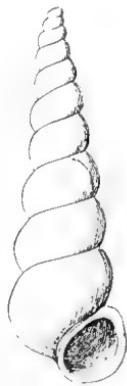
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NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART IV.

By Jos. C. VERCO, M.D., Lond., F.R.C.S., Eng.

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[Read October 2, 1906.]

PLATES VIII. TO X.

Family PATELLIDÆ, Carpenter.

Genus PATELLA, Linné.

*Patella* ~~triamerica~~ <sup>40</sup> *Helcioniscus* *tramosericus*, Martyn.

*Patella tramosericus*, Martyn, Univ. Conch., t. 16; Reeve, Conch. Icon., Mon. Patella, 1854, pl. xiii. f. 27; Adcock, Hand-list of Aquatic Moll., S. Aust., 1893, No. 392; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, xv. (n. s.), p. 191; *Helcioniscus tramosericus*, Martyn, Pilsbry, Tryon's Man. Conch., 1891, xiii., p. 142, pl. lxx., figs. 49, 50, 51, 52; Tate and May, Proc. Linn. Soc., N.S.W., 1901, p. 411.

*Patella diemenensis*, Philippi, Zeit. f. Malak., 1848, p. 162; type locality, Hobart; Pilsbry, Tryon's Man. Conch., xiii., p. 155.

*Patella variegata*, Reeve, Conch. Icon., 1854, Mon. Patella, pl. 16, f. 36, a, b, and c.

*Patella antipodum*, E. A. Smith, Voy. Erebus and Terror, Moll., p. 4, t. 1, f. 25, 1874, teste Pilsbry., *op. cit.*, p. 142.

Pritchard and Gatliff, *loc. cit.*, give *Helcioniscus melanostomus*, Pilsbry, Tryon's Man. Conch., xiii., 1891, p. 151, pl. xxxii., figs. 67 and 69 as a synonym.

This is a very variable shell. The large yellowish or rose-tinted shell figured by Reeve is comparatively rare in South Australia. Some are wholly salmon-coloured without any rays, others have dark chestnut rays. There is a horn-coloured variety with yellow-brown rays, and fine black lines, mostly in pairs in some of the interspaces. The black lines may be quite wide, and be in all the interspaces, and they may be interrupted or reticulate. The variety *variegata* of Reeve is more common; of a yellowish tint, rather translucent, with more or less interrupted dark purplish rays and very iridescent interior. These merge into a larger, more hemispherical form of stouter build, recalling Philippi's description of *P. diemenensis*, which seems to be our usual variety, and these into one with very broad, dark, liver-coloured rays separated by narrow bands of white.

*Asteracmea* <sup>46</sup> *Helcioniscus illibrata*, spec. nov. Pl. x., figs. 6 to 14.

Shell minute, rather solid, conical; apex blunt, scarcely anterior; posterior slope scarcely convex, anterior scarcely concave; no radial sculpture; some irregular growth lines.

Base not flat, sides concave; so that the shell rests on its ends; subcircular; margin simple. Apex pinkish, ground colour faint brownish pink. From just below the pink apex radiate four broad opaque white bands, which increase to eight.

*Dim.*—Height, 2·6 mm.; major diam., 2·7 mm.; minor diam., 2·25 mm.

*Hab.*—Spencer Gulf, dredged alive, depth unknown, 7 individuals.

The radula contains about 36 consecutive segments, each consisting of two marginals, two outer laterals, and one inner lateral.  $2(2\cdot1\cdot0\cdot1\cdot2)2$ . The marginals are thin and colourless, with a long stem (fig. 8), the extremity expanded laterally in a central direction (fig. 11), and reflected (fig. 10); the outer one the larger and including the inner (fig. 11). The outer laterals are short, stout, very closely approximated, hooked at the end, and brown (figs. 8, 11, 14). The inner laterals are less approximate, much longer (figs. 8, 11, 13), articulate at their base with the outer laterals (figs. 9, 12), but are separable from them.

*Obs.*—I have called it a *Helcioniscus*. The dentition does not correspond with that of any of the *Patellidae*, which seem all to have three marginals, whereas this appears to have only two. But for this its dentition is that of *Helcioniscus*,  $3(2\cdot1\cdot0\cdot1\cdot2)3$ , and *Patellina*; but its branchial cordon is incomplete, and this would place it in *Helcioniscus*.

The figures are not all drawn from the same radula, but from three radulae obtained from three individuals of apparently the same species.

#### *Patella ustulata*, Reeve.

*Patella ustulata*, Rve., Conch. Icon., 1855, vol. viii., pl. xxxi., f. 88, a, b; Ten.-Woods, P.R.S., Tasm., 1877 for 1876, p. 49; also 1878 for 1877, p. 45; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. 26, pt. 3, p. 411; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), p. 193; *P. (scutellifera) ustulata*, Rve., Pilsbry., in Tryon's Man. Conch., vol. xiii., p. 101, pl. xxii., figs. 11, 12.

*Patella tasmanica*, Ten.-Woods, Proc. Royal Soc., Tasm., 1876 for 1875, p. 157; also 1877 for 1876, p. 49; 1878 for 1877, p. 45; Tate and May, op. cit., p. 411; Pritchard and Gatliff, op. cit., p. 193.

This species is not found in Adcock's Handlist, and was only represented by a few poor specimens among our collectors until recognized by me at Port MacDonnell in January of this year, when very many somewhat beach-worn specimens were found.

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*Patellana squamifera* 37  
*Patella aculeata*, Reeve.

*Patella aculeata*, Rve., Conch. Icon., 1855, vol. viii., pl. xxxii., f. 90; Angas, Proc. Zool. Soc., 1867, p. 221, No. 224; Ten-Woods, Proc. Roy. Soc., Tasm., 1878 for 1877, p. 45; Brazier, Proc. Linn. Soc., N.S.W., 1883, p. 224; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 410; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, xv. (n. s.), pt. 2, p. 193; *P. (scutellastra) aculeata*, Rve., Pilsbry., Man. Conch., vol. xiii., p. 100, pl. 25, figs. 20, 21, pl. lxii., figs. 71 to 75.

*P. squamifera*, Reeve, Conch. Icon., pl. xxxii., f. 94; Angas, loc. cit., No. 225; Pritchard and Gatliff, loc. cit., p. 193.

Found in numbers on the rocks at Port MacDonnell. As Tenison-Woods says of *P. ustulata*, Reeve, it lives "below low water" on the rocks on the ocean shore; it is commonly covered with nullipore, is very liable to erosion when old, and then is almost indistinguishable during life from *Acmaea alticostata*, Angas. It may, if uneroded and not hidden, be almost black over the ribs and interspaces, or in the inter-spaces only, or in broken concentric rings, or of a wholly yellowish-brown tint. Internally some are uniformly white, but for a few brown smears at the apex; others have the spatula (which is never very distinct) tinged with deep chestnut, or blotched with black, or with a bluish reflex. The interior may be horn-coloured, with an indistinct ring of white or greenish-blue between it and the spatula, or bluish with smears of brown. The margin may be light brown or dark brown or black or purple, with white sulci at the ribs. There may be bluish radii from summit to border. The ribs may be very prickly, with erect scales, or only rugose. The interstitial riblets may vary in the same shell from one to six, and in different individuals there may be only one or as many as six in each.

**Patella hepatica**, Pritchard and Gatliff.

*Patella hepatica*, Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 3, p. 194.

*Acmaea striata*, Pilsbry., (non Quoy and Gaimard), Man. Conch., vol. xiii., p. 47, pl. xxxv., figs. 27, 28, 29.

Taken dead on beach at Port MacDonnell.

*Obs.*—The last three species resemble one another, and differ from the *P. tramoserica* series in being crenulated along the inner margin. I found all three at Port MacDonnell; *P. aculeata* alive on the rocks, *P. ustulata* and *P. hepatica* on the beach. But I found forms intermediate between them, so that it became impossible to say whether they should be placed in one species or the other. In fact, I had grouped all together as *P. ustulata*, and made two varieties—at the one extreme with marked ridges, which were

prickly, and at the other with only small uniform crowded ribs. Later, these were found to be on the one hand more prickly and costate than specimens of *P. aculeata*, from New South Wales, and on the other to be identical with *P. hepatica*, from Victoria. I feel confident that a larger series will unite these three as conspecific, and they will be called *P. ustulata*, Reeve.

*Patellanae* *Patella chapmani*, Ten.-Woods.

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*Patella chapmani*, Ten.-Woods, Proc. Roy. Soc., Tasm., 1876 for 1875, p. 157; Pilsbry., in Tryon, Man. Conch., 1891, vol. xiii., p. 101; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), p. 193; Tate and May, Proc. Linn. Soc., 1901, vol. xxvi., p. 410.

*Acmæa alba*, Ten.-Woods, Proc. Roy. Soc., Tasm., 1877 for 1876, pp. 155, 156; Pilsbry., 1891, *op. cit.*, p. 54, pl. xlii., figs. 76-78; Tate and May, *loc. cit.*; Pritchard and Gatliff, *loc. cit.*

Tate and May, *loc. cit.*, identify it with *P. stellaeformis*, Rve., Conch. Icon., f. 48. It is rare in S. Aust., but has been taken at Port MacDonnell (W. T. Bednall) and at Royston Head, Yorke Peninsula.

Genus *NACELLA*, Schumacher.

*Nacella*

*Nacella parva*, Angas.

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*Nacella parva*, Angas, Proc. Zool. Soc., 1878, pl. liv., f. 12; "Hab.", Holdfast Bay and Aldinga Bay; parasitic on seaweed; Adcock, Handlist of Aquatic Moll. 1893, p. 9, No. 393. It has been found as far east as Aldinga Bay, and as far west as Fowler's Bay. It appears to be of limited habitat, for Pritchard and Gatliff do not record it in their Victorian catalogue, nor Tate and May in their Tasmanian Census. I have not seen it from W. Australia.

*Nacella*

*Nacella compressa*, spec. nov.

Pl. viii., figs. 11, 12.

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Shell narrowly elongate, elliptical; sides straight, parallel; ends round. Apex overhangs one end (which is concave vertically, and slightly narrower than the other), barely oblique slightly to the left of the midline. Dorsum convex, rising higher than the nucleus. Sides nearly vertical; base flat, margin simple. Concentric growth lines, and microscopic radial scratchings.

Dim.—Length, 5 mm.; breadth, 1·6 mm.; height, 1·25 mm.

Locality.—Investigator Strait, 15 fathoms, 6 dead.

Diagnosis.—Its shape separates it from *N. parva*, Angas, which measures 5·6 mm. by 2·8, and is therefore twice as wide for the same length. It may be only a variant of this species, cramped by residence on very narrow zostera or other growth.

*Nacella cestriacmea*

*Nacella crebristriata*, Verco.

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Trans. Roy. Soc., S. Aust., 1904, vol. xxviii., p. 144, pl. xxvi., figs. 20, 21.

The only habitat given was South Australia, but Tate's shells almost certainly came from Moonta Bay, as they were in a tube with others which I have described in this paper as *Scutellina alboradiata*, sp. nov., and which have been obtained in numbers at Moonta Bay by Mr. Zietz.

*Asteracmea* *Nacella stowæ*, spec. nov. Pl. x., figs. 4, 5. 48

Shell oval, thin, translucent, narrower in front, about half as wide as long, its height less than half its greatest width. Apex at the anterior sixth, simple, non-spiral. Numerous fine diverging axial striæ, with crowded minute sublenticular accremental striæ. Apex red; sixteen equidistant, pink, increasing radial rays, each composed of two to four lines; white opaque blotches, irregular in shape behind the apex, somewhat concentrically arranged; a central linear one just behind the apex. Spatula shaped as in *Patella*; fairly distinct, margined in front opaque white; behind this pinkish-brown, which extends backwards in two short diverging flames; between these a white opaque flame extends back from the apex of the shell. The rest of the spatula is mottled with wavy, opaque, white blotches.

Dim.—Length, 5·3 mm.; breadth, 3·7 mm.; height, 2·1 mm.

Locality.—Shell sand, beach, Port MacDonnell, and King's Point, Encounter Bay (Miss Stow).

Family ACMÆIDÆ.

Genus ACMÆA, Eschscholtz.

*Acmaea octoradiata*, Hutton.

*Patella octoradiata*, Hutton, Cat. Marine Moll. of New Zealand, 1873, p. 44; *Acmaea saccharina*, Linné, var. *perplexa*, Pilsbry, Tryon's Man. Conch., 1891, vol. xiii., p. 50, pl. xxxvi., figs. 69, 70, 71; *Acmaea perplexa*, Pilsbry, Taylor, Nautilus, 1892, vol. vi., p. 89; *Acmaea saccharina*, Linné, Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 411; *Patella perplexa*, Pilsbry, Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv., pt. 2, p. 194; *Acmaea octoradiata*, Hutton, Hedley, Proc. Linn. Soc., N.S.W., 1904, pt. 1, p. 188.

This is very rare in South Australia. It has been found on the beach at Wallaroo Bay and at Port MacDonnell.

*Patelloidea* *Acmaea alticostata*, Angas. 43

*Patella alticostata*, Angas, Proc. Zool. Soc., Lond., 1865, p. 56, pl. ii., f. 11; type locality, Port Lincoln; Hedley, Proc. Linn. Soc., N.S.W., 1904, pt. 1, p. 189.

From Port MacDonnell, along the whole coastline to Western Australia, and recorded from Tasmania, Victoria, and New South Wales.

*Obs.*—Angas, in Proc. Zool. Soc., 1867, p. 221, made his name a synonym of *Patella costata* (*Lottia costata*), Sowerby, Moll., Beechey's Voy., t. 39, f. 2, 1839; and as *Acmaea costata*, Sow., his shell is referred to by Ten.-Woods, Proc. Roy. Soc. Tasm., 1877, p. 50, and *op. cit.*, 1878, pp. 44 and 45; Pilsbry, in Tryon's Man. Conch., vol. xiii., p. 51, pl. xxxvi., f. 72-77; Adcock, Handlist of Aquatic Moll.; S. Aust., 1893, p. 9, No. 394; Tate and May, Proc. Linn. Soc., N.S. Wales, 1901, vol. xxvi., part 3, p. 411; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n.s.), part 2, p. 194. But Hedley affirms them to be different species, *loc. cit.*

It may reach the size of 2 in. long, 1·7 broad, and .8 high. It is nearly always narrower anteriorly, sometimes markedly so; very rarely it is quite elliptical. The height may be .7 in. in a shell only 1·1 in. long, or only .5 in 1·6, just twice as high proportionally. The shape may be acutely conical and straight-sided or flat-topped and convex-sided. The ribs vary from 14 to 27, increasing by intercalation with age. The interstices may be prettily ornamented with close-set fuscous crescentic lines, convex towards the apex; these may climb the sides of the ribs, or cross them; they are more marked in beach-worn shells. The interior may be wholly white, including the margin; even the spatula may be scarcely tinted or distinguishable. The latter may be blackish-brown, or of any lighter tint of brown, its anterior and posterior parts being usually much darker. The margin may have no colouration, or very dark spots may mark all or some of the interspaces between the ribs. In addition to these a light-brown band may completely margin the inner border, or this may be found alone of any darker tint up to a purplish black. More or less rusty colouration may be found between the spatula and the margin, generally in blotches.

#### *Acmaea marmorata*, Ten.-Woods.

Proc. Roy. Soc., Tasm., 1876 for 1875, pp. 156, 157, and 1877 for 1876, p. 53; Pilsbry, Tryon, Man. Conch., 1891, vol. xiii., p. 52, pl. xlvi., figs. 66-70; Adcock, Handlist Aquatic Moll., S. Aust., 1893, p. 9, No. 399; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 412; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 197.

*Patella latistrigata*, Angas, Proc. Zool. Soc., Lond., 1865, p. 154, and p. 186, No. 196A; Adcock, *loc. cit.*, 1893; Pritchard and Gatliff, *loc. cit.*; *Helcioniscus latistrigata*, Angas, Pilsbry., *loc. cit.*, p. 143.

*Locality*.—From Port MacDonnell to Port Victoria, Spencer Gulf.

*Obs.*—My largest individual from Port MacDonnell measures 24 mm. long, 22·5 wide, and 10 high. The alti-

tude varies very greatly from 3·5 mm. in a shell 17 mm. long to 8·5 mm. in one 18 mm. long. When on the rocks they may be so rough and acutely costate as to be mistaken for *A. alticostata*, Angas. Usually with a flat base, it may rest on its ends, with the sides of the border much raised. As variations from the description by Ten-Woods, the spatula may be white, with some brown clouding in its centre, the interior of the shell being a light brown, or the spatula may be black and the rest of the interior white except for black articulations of the border. The most constant feature in the ornament is the dark dotting of the spatula, but in the pallid examples this is very slight.

Adcock makes *P. gealei*, Angas, a synonym, and Pritchard and Gatliff give it priority, and *A. marmorata* as a synonym; but Angas's shell is a distinct species. *P. latistriata*, Angas, from Aldinga, is a half-grown example, with broad radial stripes.

#### *Acmaea calamus*, Crosse and Fischer.

*Patella calamus*, Crs. and F., Journ. de Conch., 1864, p. 348; 1865, p. 42, pl. iii., figs. 7, 8; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 412; *Acmaea calamus*, Crs. and F., Angas, Proc. Zool. Soc., Lond., 1865, p. 186, No. 200; Pilsbry., Tryon, Man. Conch., 1891, vol. xiii., p. 54, pl. xxxvii., figs. 3, 4; Adcock, Handlist Aquatic Moll., S. Aust., 1893, p. 9, No. 395; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 197.

*Locality* of type, St. Vincent Gulf, South Australia. I have taken it at Port MacDonnell, and dredged it from Backstairs Passage to Spencer Gulf, alive, at all depths from 5 to 17 fathoms. Most abundant in the shallower water.

Tate in Trans. Roy. Soc., S. Aust., May, 1897, thought it would prove to be a synonym of *Acmaea conoidea*, Quoy and Gaimard, and this suspicion seems to have been confirmed, as he lists it thus in his Tasmanian Census in 1901. He speaks of *A. conoidea*, in 1897, as though he had seen Quoy's type, and as having a circular aperture and five radial threads. But Quoy seems to have only had one shell collected at King George's Sound. This Deshayes had not seen (Anim. S. Vert., 2nd edit., vol. vii., p. 551), and Quoy does not describe it as having any radial threads, but as being "obtuse and rounded at the apex"; this *A. calamus* never is, either alive or dead or rolled.

The dimensions given by Crosse are 12·5 mm. by 10 by 6, but they reach 16·5 by 14 by 7·5. The shell may be wholly white within and without, or the apical part may be white and the rest ornamented, either with tiny brown spots, more or less abundantly and irregularly scattered over the surface,

or only as regular dots around the inner margin, or as short radial brown lines at the internal periphery, or as a continuous brown border. Some are uniformly chestnut brown. One form has abundant colour-marking, which may begin at the apex as six to eight rays, tending to break up into tessellations as they widen. This variety is often slightly polygonal instead of round, the angles being in the white rays; but it grades into the ordinary form.

*Chiazacmea conoidea*  
*Acmæa flammea*, Quoy and Gaimard.

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*Patelloida flammea*, Quoy and Gaimard, Voy. Astrolabe, Zool., vol. iii., 1834, p. 354, pl. lxxi., figs. 15 to 24; Lamarck, Anim. s. Vert. (2nd edition, Deshayes, etc.), vol. vi., p. 552, 1836; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 411; Ten.-Woods, Proc. Roy. Soc., Tasm., 1877 for 1876, p. 51.

*Acmæa flammea*, Quoy and G., Pilsbry, Tryon, Man. Conch., 1891, vol. xiii., p. 57, pl. xxxvii., figs. 78-83; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 196.

*Acmæa crucis*, Ten.-Woods, Proc. Roy. Soc., Tasm., 1877 for 1876, p. 52; and 1878 for 1877, p. 53; Pilsbry., *op. cit.*, p. 58, pl. xxxvii., figs. 12, 13, and 17, 19; Adcock, Handlist Aquatic Moll., S. Aust., 1893, p. 9, No. 400; Tate and May, *loc. cit.*, p. 411; Pritchard and Gatliff, *loc. cit.*, p. 196.

*Patella jacksoniensis*, Reeve, Conch. Icon., vol. viii., 1855, pl. xxxix., figs. 127, a, and b; Tate and May, *loc. cit.*, p. 412; Pritchard and Gatliff, *loc. cit.*, p. 196; *Tectura jacksoniensis*, Reeve, Pilsbry., *loc. cit.*, p. 58, pl. xlii., figs. 71-75, and *var mixta*, Reeve, *loc. cit.* pl. xxxv., figs. 32, 33.

*Patella gealei*, Angas, Proc. Zool. Soc., Lond., 1865, p. 57 and p. 186, No. 198; not Adecock, *loc. cit.*, p. 9, No. 399; *Acmæa gealei*, Angas, Tate and May, *loc. cit.*, p. 412; not Pritchard and Gatliff, *loc. cit.*, p. 197.

*Patella mixta*, Reeve, Conch. Icon., 1855, vol. viii., pl. xxxix., figs. 129, a and b; Pritchard and Gatliff, *loc. cit.*, p. 196.

The type locality of *A. flammea*, Q. and G., is Hobart-town, and the type dimensions are small, 5 lines by 4 by 2½ high.

The type locality of *A. crucis*, Ten.-Woods, is Tasmania, and its dimensions are 31 mm. by 31 by 19 high. Ten.-Woods described this as a distinct species, but Tate and May and Pritchard and Gatliff unite them.

Ten.-Woods refers to *Patella cruciata*, Linné, as distinct from his *A. crucis*, because the former has "a white cross on a brown ground," instead of a brown cross on a white ground, and Pritchard and Gatliff agree. But Tate and May unite them, and make *A. cruciata*, Lin., the specific name, and the other two synonyms. I keep them distinct. Ten.-Woods also leaned to the identity of *A. flammea*, Quoy and Gaimard, and *A. subundulata*, Angas, and Pritchard and Gatliff unite them. Shells collected by me and identified by Angas's type in the British Museum have not been yet graded into Quoy's species, and are regarded as distinct.

*A. jacksoniensis*, Reeve (type locality, Port Jackson), is represented in Tate's collection of South Australian shells, but I am unable to separate them from *A. flammea*, Quoy and Gaimard, and agree with Pritchard and Gatliff, who unite them. The type locality of *P. mixta*, Reeve, is Port Phillip, Victoria. Tate and May make *jacksoniensis*, Reeve, a synonym of *A. gealei*, Angas, as a distinct species, owing to the pre-occupation of Reeve's name by Lesson. The two type shells of *P. gealei*, in the British Museum, from South Australia, presented by Mr. G. F. Angas, are 24 mm. by 21, regularly roundly oval in the base, with an almost perfectly regular thin margin, with no radial ribbing, nor any radiating dark colour bands. I think they are large albino variants of *A. crucis*, Ten.-Woods.

*A. gealei*, Angas, was formerly regarded in South Australia as a synonym of *A. marmorata*, Ten.-Woods, No. 399, Adcock's Handlist; and Pritchard and Gatliff gave it priority and made the latter the synonym; but examination of the type shows absolute non-identity.

The shell is certainly very variable. One form has numerous well-marked radial riblets, and a sharp apex, and may be regarded as the typical *A. flammea*, Quoy. A second has no radial riblets, or only obsolete, is a larger shell, and is the typical *A. crucis*, Ten.-Woods. A third has comparatively few radial costæ, which are broad and rude, and somewhat corrugate the surface; and is the *Patella jacksoniensis*, Reeve. A fourth is very like the second, but differs in having no radial colour markings, or radial ribs, and is the *A. gealei*, Angas. But all four can be graded into one another in continuous series. The comparative height varies, some shells being quite conical, and others very flat. The colour ornament may consist solely of the dark spatula, or a distinct broad Maltese cross may be present, or each arm may be broken up into two or more brown lines, or brown lines may intervene between them, or only brown radii may occur, or the ornament may be a brown-and-white tessellation or reticulation at the apex only, or all over the shell, or combined with the cross. The inner border may be wholly white, or have a brown border, or be articulated brown and white, or show only the four broad ends of the brown cross. Among all the specimens collected I have not found one coloured like *A. cruciata*, Linn., with the white rays at the centre of the front and back and sides, and the brown between.

*CHIA*  $\times$  *Acmæa conoidea*, Quoy and Gaimard.

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*Patelloidea conoidea*, Q. and G., Voy. Astrolabe, Zool., vol. iii., 1834, p. 355, pl. lxxi., figs. 5 to 7; Lamarck, Anim. s. Vert. (2nd edition, Deshayes, etc.), vol. vii., p. 551.

*Acmæa conoidea*, Q. and G., Angas, Proc. Zool Soc., Lond., 1865, p. 186, No. 199; Pilsbry, Tryon, Man. Conch., vol. xiii., 1891, p. 53, pl. xxxvii., figs. 84, 85; Adcock, Handlist Aquatic Moll., S. Aust., 1893, p. 9, No. 396; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pt. 3, p. 412; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 195.

Type locality, King George's Sound, Western Australia, taken alive, only one example.

Tate regarded it as conspecific with *A. calamus*, Crosse and Fischer, and made this a synonym, but this is a mistake.

Port MacDonnell; on rocks above low water.

*NOTO Acmæa subundulata*, Angas.

59

Proc. Zool. Soc., Lond., 1865, p. 155, and p. 186, No. 202; Ten.-Woods, Proc. Roy. Soc., Tasm., 1877 for 1876, p. 52; Adcock, Handlist Aquatic Moll., S. Aust., 1893, p. 9, No. 398; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 196. *Tectura subundulata*.

*Tectura subundulata*, Angas, P.Z.S., 1867, p. 220, No. 218.

Angas's type locality was Port Lincoln. I have dredged several alive at seven fathoms in St. Vincent Gulf: in Hardwicke Bay, three miles off shore; and in Eastern Cove, Kangaroo Island, and collected it on the ocean beach, Kangaroo Island, and at Normanville. These have been identified from Angas's types in the British Museum by me.

Ten.-Woods, *loc. cit.*, was doubtful if it would not be found identical with *A. flammea*, Quoy, and Pritchard and Gatliff, *loc. cit.*, record it as a synonym of Quoy's species; but, after comparison with a large number and various forms of this variable shell, I cannot recognize it as conspecific.

*Nucula (?) Acmæa punctata*, Quoy and Gaimard.

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*Patelloidea punctata*, Q. and G., Voy. Astrolabe, Zool., vol. iii., p. 365, pl. lxxi., figs. 40, 42.

The type locality is King George's Sound, Western Australia. I have two shells dredged, of almost the same size, 6 mm. by 4 by 2·25, with the apex carried well forward, and slightly antecurved, exceedingly finely radially striated under the lens, the base level, inner margin smooth. White or yellowish externally, with two circles of light-brown spots, about 9 in a circle. Internally white; one shows the spatula distinctly in light brown. Quoy describes his shell as *smooth*, and figures it with *three* rows of spots.

It differs from a young *A. calamus*, Crosse and Fischer, in being less round, with its apex more excentric and ante-

curved, and in having much finer and more crowded striae. It differs from *A. subundulata*, Angas, in being less elevated, less orbicular, with a sharper and more antecurved apex, and in its colour.

### *XOTO Acmaea septiformis*, Quoy and Gaimard.

*Patelloida septiformis*, Quoy and Gaimard, Voy. Astrolabe, Zool., 1834, vol. iii., p. 362, pl. lxxi., figs. 43, 44; Lamarck, Anim. s. Vert. (2nd edition, Deshayes, etc.), 1836, vol. vii., p. 550; *Tectura septiformis*, Q. and G., Angas, Proc. Zool. Soc., Lond., 1867, p. 220, No. 219; *Acmaea septiformis*, Q. and G., Ten.-Woods, Proc. Roy. Soc., Tasm., 1877, p. 50; Pilsbry., Tryon, Man. Conch., vol. xiii., 1891, p. 55, pl. xxxvii., figs. 93, 94; Adecock, Handlist Aquatic Moll. S. Aust., 1893, p. 9, No. 397; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 412; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903, vol. xv. (n. s.), pt. 2, p. 195.

*A. scabrilirata*, Angas, Proc. Zool. Soc., 1865, p. 154, and p. 186, No. 201; Pilsbry., Tryon, Man. Conch., 1891, vol. xiii. p. 56; Pritchard and Gatliff, *loc. cit.*

*A. petterdi*, Ten.-Woods, Proc. Roy. Soc., Tasm., 1877, p. 155; Pilsbry., *op. cit.*, p. 54; Tate and May, *loc. cit.*; Pritchard and Gatliff, *loc. cit.*

*Obs.*—Tate and May say *A. petterdi* is the senile form.

The shell varies in altitude from 18 mm. long, and 4·5 min. high, to 14 mm. long and 6 mm. high. Some have a cap occupying up to one-third or one-fourth of their size, with comparatively steep sides, with an abrupt assumption of the ordinary depressed shape, looking like one *acmaea* mounted on another. The base is in some uneven, resting on the front and back edges possibly because their roost was not flat. The radial lira may be marked from apex to base, and numerous, or very few, or absent, even when not rolled or eroded. The surface may be uniformly horn-coloured, or white, with radial black-brown widening bands, or with reticulated or roundish tessellated markings. The inner margin may be articulated brown and white, or have a uniform brown margin or be wholly white. The interior may be whitish, opaque glistening white, bluish-white, or with the outer colour showing through. The spatula may be dark chestnut-brown and very distinct, or almost invisible.

The surface is generally in very good condition, but some are markedly pitted with round shallow holes, especially about the summit, evidently due to boring by molluscs, and not to erosion.

*Locality*.—From Port MacDonnell to Fowler's Bay; rather common.

### *Acmaea cantharus*, Reeve. *probably 56*

*Patella cantharus*, Reeve, Conch. Icon., vol. viii., 1858, pl. xl., f. 131; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1903,

*Xotoacmaea  
septiformis*

vol. xv. (n. s.), pt. 2, p. 195; *Acmaea cantharus*, Reeve, Pilsbry., Tryon, Man. Conch., 1891, vol. xiii., p. 55, pl. xxxvii., figs. 1, 2; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 412.

The type locality is New Zealand. Tate and May list it as a distinct species. Pritchard and Gatliff cite it as a synonym of *A. septiformis*, Quoy and Gaimard. A shell from Port MacDonnell, collected in numbers, is probably Reeve's shell. *A. septiformis*, Quoy and Gaimard, is also abundant there. The two forms may run into each other, but the intermediate grades have not been taken. It is larger, much less depressed, narrower anteriorly, with the apex much nearer the front margin. It is very greatly and roughly eroded, and does not show any radial striae on the uneroded part. The colouration consists of radial brown or back stripes, varying in number and width. Internally they are very dark, a blotchy brown or a uniform blackish brown, lighter or whitish at the summit. The margin is articulated brown and white. The muscle scar is very plain as a white horseshoe, and here the shell is translucent, especially at the anterior part. Possibly they may be senile examples of *A. septiformis*, though their marked erosion contrasts strongly with the usually well-preserved surface of these.

#### Family FISSURELLIDÆ.

#### Genus EMARGINULA, Lamarck.

#### *Emarginula superba*, Hedley.

Records of the Aust. Mus., 1906, vol. vi., pt. 3, p. 216, pl. xxxvii., figs. 7, 8; type locality, 250 fathoms, east of Port Jackson.

My specimens have been identified by Mr. Hedley from his type. His shell was bleached, so to his description the following may be added:—Colour light pinkish-brown, deepest over the expanded posterior surface, gradually fading anteriorly towards the slit. It is deeper in concentric rings, which leave blotches on the bounding lamina of the slit fasciole; nine are counted in the lower two-thirds. Alternate primary ribs are white from apex to margin, and are separated by one primary and two secondary ribs, which are coloured. The anterior four of these white rays on each side of the slit are separated only by the one rib, the secondaries being absent. The colouring of the shell confirms the propriety of the name "superba."

Individuals vary. Mr. Hedley's figure is almost uniformly elliptical. Some South Australian examples are much expanded posteriorly, being broadest on a level with the apex, and thence are attenuated anteriorly. These are also much flatter towards the margin posteriorly than the type. Others are elliptical, but less flat posteriorly than the type, and

rather more compressed laterally, and have more crowded and erect imbricating concentric scales.

*Locality.*—90 fathoms, off Cape Jaffa, 10; 130 fathoms, 17; 300 fathoms, 1; 100 fathoms, off Beachport, 6; 110 fathoms, 3; 150 fathoms, 3; 200 fathoms, 1. Some were quite recent, many were broken, all were dead.

Family SCUTELLINIDÆ, Dall.

*Phenacolepas* Genus SCUTELLINA, Gray.

*Scutellina calva*, spec. n.v. Pl. viii., figs. 9, 10. 210

Shell minute, thin, conical, white; apex nearly central, directed away from the opening of the muscle scar; anterior slope uniformly convex; posterior concave, just below the apex, then barely convexly sloping to the margin. Summit smooth, but for some accremental lines, there with crowded, well-marked axial striae, distinctly granulated with concentric striae. Base oval, margin level and simple.

*Dim.*—Height, 2 mm.; major diam., 2·8 mm.; minor diam., 1·8 mm.

*Locality.*—300 fathoms, off Cape Jaffa, 31 examples, dead; 130 fathoms, 9 dead.

*Diagnosis* from *Helcioniscus illibrata*, Verco.—It is less solid, has a curved apex, flat base, axial liræ, no colour markings.

*Obs.*—I have called this little shell provisionally a *Scutellina*, because its apex is directed away from the opening of the muscle-scar; though its summit is nearly central. Its specific name indicates its bald apex.

*Phenacolepas*

*Scutellina alboradiata*, spec. nov. Pl. viii., figs. 1, 2. 209

Shell minute, thin, depressed conic. Apex simple, sub-central, slightly anterior, directed slightly away from the opening of the muscle-scar. Base level, oval, somewhat narrowed anteriorly. About eighteen very low, rounded, scarcely perceptible ribs or radial undulations, and microscopic accremental striae. Internal surface radially scratched. The rik-are ornamented with opaque white radii, rather wider than the diaphanous interspaces.

*Dim.*—Height, 2·2 mm.; maj. diam., 3·3 mm.; min. diam., 2·4 mm.

*Locality.*—Moonta Bay, Spencer Gulf; collected in numbers in shell sand by Mr. A. Zietz. Several individuals were in Tate's collection, labelled "Scutellina, sp., S.A." in the same tube as shells which I lately described as *Nacella crebri-striata*. So probably the locality of *N. crebri-striata* is also Moonta Bay.

*Diagnosis.*—From *Nacella crebristriata*, Verco; it is less solid, more rounded, has its apex less excentric, and fewer and less valid ribs. From *Scutellina calva*, it is narrowed anteriorly, has no crowded axial liræ, is white-ribbed. From *Cocculina tasmanica*, Tate and May, its apex is more central and leans backwards.

*Obs.*—In some examples the opaque radii are much narrower, or a wide and a narrow one may alternate. The opaque lines are not continuous, but composed of arrow-heads, with their points towards the margin, or of zig-zags, or dots.

Its generic location is somewhat dubious.

#### Family TROCHIDÆ.

##### Genus BASILISSA, Watson.

**Basilissa radialis**, Tate; var. **bilix**, Hedley, sp. 152

*Sequentzia polita* Pl. x., figs. 1, 2, 3. *Reguenzia radialis*, Tate, Trans. Roy. Soc., S.A., xiii.; 1890, p. 192, pl. ix., f. 6.

*Astele bilix*, Hedley, Records Austr. Mus., vi., pt. 2, 1905, p. 48, f. 13.

Shell depressedly conical, of seven and a quarter whorls, including a homostrophe smooth protoconch of one and a quarter whorls.

Spire somewhat gradate. In the first whorl one marked spiral rib; in the rest two becoming gradually more valid and distant. In the third whorl a secondary threadlet between these; in the fourth a threadlet between the first spiral and the upper suture; in the fifth two tertiaries, one between each spiral and the secondary threadlet. In the sixth, or body-whorl, another spiral rib appears below and nearly equal to the lower of the two spirals; it forms the periphery and the suture, and, separated from its fellow by a furrow, gives an apparent canaliculate suture. The base is flatly rounded with eight equi-distant, nearly equal, concentric rounded spiral liræ, as wide as their interspaces. The surface is cancellated by crowded narrow erect lamellæ, crossing the spirals and sinuous, but not following exactly the outline of the labrum, and ending at the outer basal lira. Crowded radial striae cancellate and granulate the base, and extend to the lira nearest the umbilicus. Aperture obliquely quadrate, with a large posterior sinus in the outer lip, rather deeper than wide; a second at the baso-labral junction, beginning at the third spiral rib, about as deep as the infra-sutural one, and rather wider; and a third shallow and wide at the baso-columellar angle. Columella oblique, concave, expanded towards the umbilicus, trun-

cate anteriorly. Inner lip thin from columella to posterior sinus, smooth. Interior of aperture smooth. Umbilicus deep, small, marginated with oblique plicate tubercles.

*Dim.*—Alt., 3'6 mm.; diam., 3'4 mm.

*Locality.*—Shell figured and described (in Dr. Verco's collection), with four others, dredged, dead, 130 fathoms, off Cape Jaffa; 300, off Cape Jaffa, seven, immature and broken, and six large and complete, one quite recent.

*Obs.*—This shell was figured for description as a new species, but Mr. Hedley recognized it as his *Astele hilir*, which was an immature shell, and did not plainly reveal the apertural sinuses. He suggested its location in Watson's genus *Basilissa*, as emended by Dall, in Bull. Mus. of Comp. Zool., 1889, pp. 383-385. With this it corresponds closely. One individual shows very well the nacreous central claw-like process in the labrum, somewhat inflected, to which Dall refers. It very probably belongs to the section *Ancistrobasis*, Dall, though none of my shells show the internal thickening and grooving of the outer lip; but Dall points out that this character only occurs in adult shells.

*Seguenzia radialis*, Tate, an Eocene fossil from Muddy Creek, the type of which is in the Tate Museum of the University of Adelaide, has the two spirals which form the canaliculate suture closer together than our recent form; it has a prominent spiral threadlet above the second spiral rib and the first spiral rib is absent: so the fossil is less gradate, and the whorls are more sloping, and have more nearly uniform spirals. The base is flatter, the perforation and its bordering tubercles are larger. Dall, however, in discussing *B. costulata*, Watson, and var. *depressa*, Dall, notes the great variability of abyssal shells in general, and of that species in particular. The same consideration probably holds good in our shell, which has therefore been made only a variety of Tate's fossil species.

One individual with a perfect aperture shows the labrum to be very irregular, owing to the projection at the border, of every spiral rib and threadlet, into a minute marginal tooth, proportional to its size as a spiral, except those which end in the depth of the two labral sinuses.

#### Genus SCALA, Klein.

##### *Scala nepeanensis*, Gatliff.

Proc. Roy. Soc., Viet., 1906, vol. xix. (n. s.), Pt. 1, p. 1. Pl. 1, fig. 5. "Shell sand, Ocean Beach, Point Nepean."

One example has been found in dredge-siftings, depth and locality not noted, probably St. Vincent Gulf.

Family TRICHOTROPIDÆ. *not in Gaster-*  
 Genus LIPPISTES, Montfort. *not in Gaster-*  
*1938*

**Lippistes separatista**, Dillwyn, sp. Pl. ix., figs. 6 to 9.

*Turbo helicoides*, Gmelin, Syst. Nat., p. 3598, No. 109; *Turbo separatista*, Dillwyn, Conch. Cab., vol. x., p. 298, pl. clxv., figs. 1589, 1590; Cat. Recent Shells, ii., p. 867, 1817; Wood, Ind. Test., p. 151, pl. xxxii., f. 126, 1825; *Separatista chemnitzii*, A. Adams, Proc. Zool. Soc., Lond., 1850, p. 45; Tryon, Man. Conch., ix., p. 45, pl. viii., f. 70; Rep. Challenger, Zool., xv., p. 428; *Trichotropis tricarinata*, Brazier, Proc. Linn. Soc., N.S.W., 1877, i., p. 313; *Separatista separatista*, Dillwyn, Hedley, Records Aust. Mus., iv., No. 3. 1901, p. 126, pl. xvii., f. 22; *Lippistes separatista*, Dillwyn, Hedley, Proc. Linn. Soc., N.S.W., 1902, p. 24; *Trichotropis blainvilleanus*, Petit, Journ. de Conch., ii., 1851, p. 22, pl. i., f. 5; Tryon, Man. Conch., 1887, ix., p. 45, pl. viii., f. 69; *Trichotropis gabrieli*, Pritchard and Gatliff, Proc. Roy. Soc. Vict., 1889, p. 183, pl. xx., f. 7; *ibid*, 1900, vol. xiii., p. 142.

Some years ago five shells were dredged by me, all dead, one in 13½ fathoms in Investigator Straits, off Point Marsden, Kangaroo Island; two in 16-18 fathoms, Backstairs Passage, and two in deep water, exact station unrecorded.

This form was named and described by me in manuscript as a new species chiefly because its whorls were curiously polygonal, with a tubercle on the carinae at each angle. See pl. ix., fig. 6. But in 1899 I had the opportunity at the Natural History collection of the British Museum in London, of comparing it with various species of the *Trichotropidæ*, and Mr. E. A. Smith kindly assisted me.

*Lippistes helicoides*, Gmelin, from the Philippine Islands, with four shells on the tablet, were identical. On the back of the tablet carrying them was the following:—" *Turbo helicoides*, Gmelin," which meant that Mr. E. A. Smith had compared these four shells with Gmelin's description and found them to correspond. Gmelin's types are unknown; possibly he described only from a figure found elsewhere. Also, "*Separatista chemnitzii*, A. Ads., P.Z.S., 1850, p. 45, types, I. Bureas, Phil., H. Cuming." This means that these shells were in Cuming's collection, were obtained from Bureas Island, in the Philippine Islands, and are the types of *S. chemnitzii*, A. Ads. Also, "Mekran coast in Coll. Melvill," signifying that shells in Melvill's collection from the Mekran coast had been compared by E. A. Smith, and found to be identical. Mine were demonstrably conspecific, and Adams's shells were found to possess the same polygonal form, with the tendency to tuberculation at the angles. There is no question about the identity of our shell with Adams's species, and as this has been made a synonym of Dillwyn's species, Dillwyn's name should be accepted by us.

Watson, in the "Challenger" Reports, xv., p. 429, agrees with Beck in the identity of *S. chemnitzii*, A. Adams, and *T. blainvilleanus*, Petit. Mr. Gatliff acknowledges the identity of his species with Petit's. He has kindly allowed me to compare his type with my South Australian examples, and see their identity.

Mr. Gatliff also provided me with a living individual dredged in five fathoms, off the shores of Victoria. It is covered with an epidermis, extremely thin on the smallest whorls (possibly worn away), but well marked on the later. It is simple on the tabulated slope, on the base and in the umbilicus only varied by minute axial lines. On the three carinae it is elevated into low spiral laminæ, which are connected by more marked axial laminæ. At intervals these are large, and projected forwards to form imbricating flounces, while between them may be 3 to 7 of the smaller ones. These flounces correspond with the tubercles at the angles of the polygonal whorls. They are figured in pl. ix., fig. 7, but very imperfectly, owing to its drying up.

From his living example I was able to extract the radula. This is very similar to that of *Trichotropis borealis*, Broderip, as figured in Fischer's Manuel de Conch., 1887, p. 689. It has a rachidian tooth with a multicuspitate margin, rather more finely serrated, a large transversely quadrangular lateral with a multicuspitate border and two simple arcuate sharp marginals. (Pl. ix., fig. 9.)

The operculum is horny, subtrigonal, with an apical nucleus (pl. ix., fig. 8), and fairly closely resembles that of *T. borealis*, Brod. The affinity of our southern subtropical form with that of the arctic form is thus demonstrated.

~~Lippistes~~ SEE 476 to 478 in my list. ~~not in list!~~  
~~Lippistes~~ Lippistes meridionalis, spec. nov. Pl. ix., figs. 1, 2. ~~list!~~  
SEE list ad p 366 S.A. Mal cuses 1

Shell turbinate solid, whorls five, rapidly increasing. Protoconch, one and a half whorls, convex, smooth, but for four equal and equi-distant liræ. It ends abruptly with a distinct border, not thickened or reflected. The spire whorl begins with a not quite smooth area, from which the granular spiral liræ gradually arise. Spire whorls are tricarinate. In the first the central carina is more prominent, in the second it is level with the others, in the third it is less prominent. Sloping scarcely convex from upper suture to posterior carina, vertical from this to lower suture. On the slope are four equi-distant spiral liræ, one-third or one-fourth the width of their interspaces, increasing in size with the whorls. Base somewhat concave. A peripheral carina, less marked than those on the spire, forms the suture. Below it are four broad spiral bands, wider than their interspaces, and microscopically

spirally incurved. Crowded axial liræ, about as wide as their interspaces cross the carinæ; every sixth or seventh one is strong; the next two or three are finer, and those following gradually increase. At the intersections are minute tubercles, which at intervals are comparatively large. The basal axials are less unequal. Aperture quadrangularly hemispherical, produced at the baso-columellar junction. Outer lip corrugated by the carinæ. Columella concave, with a tooth-like prominence below. Inner lip valid, applied to the base on its upper half. Perforation well marked, somewhat rimate.

*Dim.*—Alt., 3·6 mm.; diam., 2·9 mm.; aperture, 2·1 mm. by 1·6 mm.

*Locality*.—Type, 40 fathoms, off Beachport, dead, with two co-types; 110 fathoms, 2 dead.

*Diagnosis*.—From *Lippistes separatista*, Dillwyn. It is much smaller, and more solid, the protoconch is much smaller: the whorls increase less rapidly, have three liræ on the spire and four on the body-whorl, are lirated on the infra-sutural slope instead of smooth, have no polygonal shape, the base is lirated instead of smooth, axial liræ tuberculate the carinæ and continue to the columella, and the umbilicus is rimate.

#### Genus SEGUENZIA, Jeffreys.

**Seguenzia polita**, Verco, *spec. nov.* Pl. ix., figs. 3, 4, 5. 152

Shell white, smooth, glistening, turbinate, of six whorls. Protoconch one and a quarter whorls, homostrophe, smooth, round. Spire gradate, flatly concave, from simple suture (with a linear furrow) to central angulation, which is scarcely keeled; then sloping barely concave to the lower suture, first two whorls with fine numerous radial striae from suture to angle, becoming gradually obsolete as microscopic accrescental lines on the later whorls. Body-whorl with a central carina, which forms the suture; a second somewhat smaller some distance anterior, somewhat concave between; a third smaller and less distant; then six concentric liræ to the perforation, which is small and rimate. Aperture subquadrate; outer lip with a deep, narrow sinus at the suture, and a deep, wide notch at the junction of the basal and outer lip, a somewhat shallower one between them, and a smaller notch at the junction of the basal lip and the columella, which is truncated so as to form a blunt tooth.

The spiral angulation ends at the deepest part of the posterior sinus; the peripheral carina in the deepest part of the central sinus; the second carina forms the posterior boundary of the baso-lateral notch, whose deepest part lies between the third carina and the first basal lira. The columella is concave, smooth, thick, polished, and expand-

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ed, so as nearly to cover the perforation. The inner lip, applied to the base, extends from the columella to the suture, and is smooth.

*Dim.*—Height, 3·5 mm.; greatest diameter, 2·4 mm.

*Locality.*—300 fathoms, off Cape Jaffa, 10 dead.

*Diagnosis.*—It approaches *S. elegans*, Jeffreys, Proc. Zool. Soc., 1876, p. 200; Tryon, Man. Conch., vol. ix., p. 47, pl. viii., fig. 75; but is distinct in having the sutural sinus with a much smaller lamina between it and the suture, the sloping part of the spire-whorls longer, a different relation of the angulation and carinae to sinus, and a less production of the baso-labral angle. It is also very similar to *Sequenzia monocingulata*, Seguenza, as figured by Dall. in Bulletin 37, 1889, of the United States Nat. Hist. Mus., p. 142, pl. lxii., figs. 88-89; but the sinuses in the aperture are different. They differ greatly, however, in the two figures given, so this species may prove eventually only a variety.

*Pugillaria* Genus SIPHONARIA, Sowerby. 914  
*Siphonaria stowæ*, spec. nov. Pl. viii., figs. 3 to 8.

Shell small, moderately solid, oval, depressed. Apex sub-terminal one-eighth distant from posterior end, slightly to the left of the mid-line, oblique, inclining backwards from the central line, pointed and slightly projecting posteriorly. Posterior end nearly vertical, slightly concave. Dorsum sub-convex, more rapidly descending anteriorly. Left margin straightly convex; right more rounded, faintly bulged at the site of the siphon, just in front of the middle point. Numerous subdistant rather rude ribs, equal in width to the inter-spaces, multiplying by frequent intercalations; rough, irregular growth lines. Interior smooth, margin invalidly crenulated. Ornament, ribs opaque white; dark brown specks, lines, and blotches, chiefly intercostal, plainer on the right side; internally light horn tint, a chestnut horseshoe around the posterior third, and broken blotches on each side of the siphon.

*Dim.*—Length, 7·5 mm.; breadth, 5·9 mm.; height, 3·25 mm. The radula contains about 94 rows of teeth, each consisting of a central denticle, with about 22 laterals on either side. The rachidian is narrow, with a small cusp tending to be bilobed. The laterals have large simple cusps, and these as well as the teeth grow gradually smaller the further they are from the centre. (Figs. 6, 7, 8.)

*Hab.*—Pondolowie Bay, in Spencer Gulf, on rocks above tide mark; 9 examples, alive. Fry in shell sand, King's Point, Encounter Bay (Miss Stow).

*Obs.*—The fry reveal a spiral nucleus of two full turns, dextral, smooth, and horn-coloured. In some, especially the smaller, the ribs are more distinct and the sculpture less rugged. Some have much more brown colouring; either in the intercostal spaces or in the internal horseshoe or both. One has the enlarged extremities of the horseshoe muscle-scar plainly painted. We have no other *Siphonaria* with its apex so near the posterior end. The largest example is 9·4 mm. by 6·5. I have named the species after Miss Stow, who collected the immature examples.

#### EXPLANATION OF PLATES.

##### PLATE VIII.

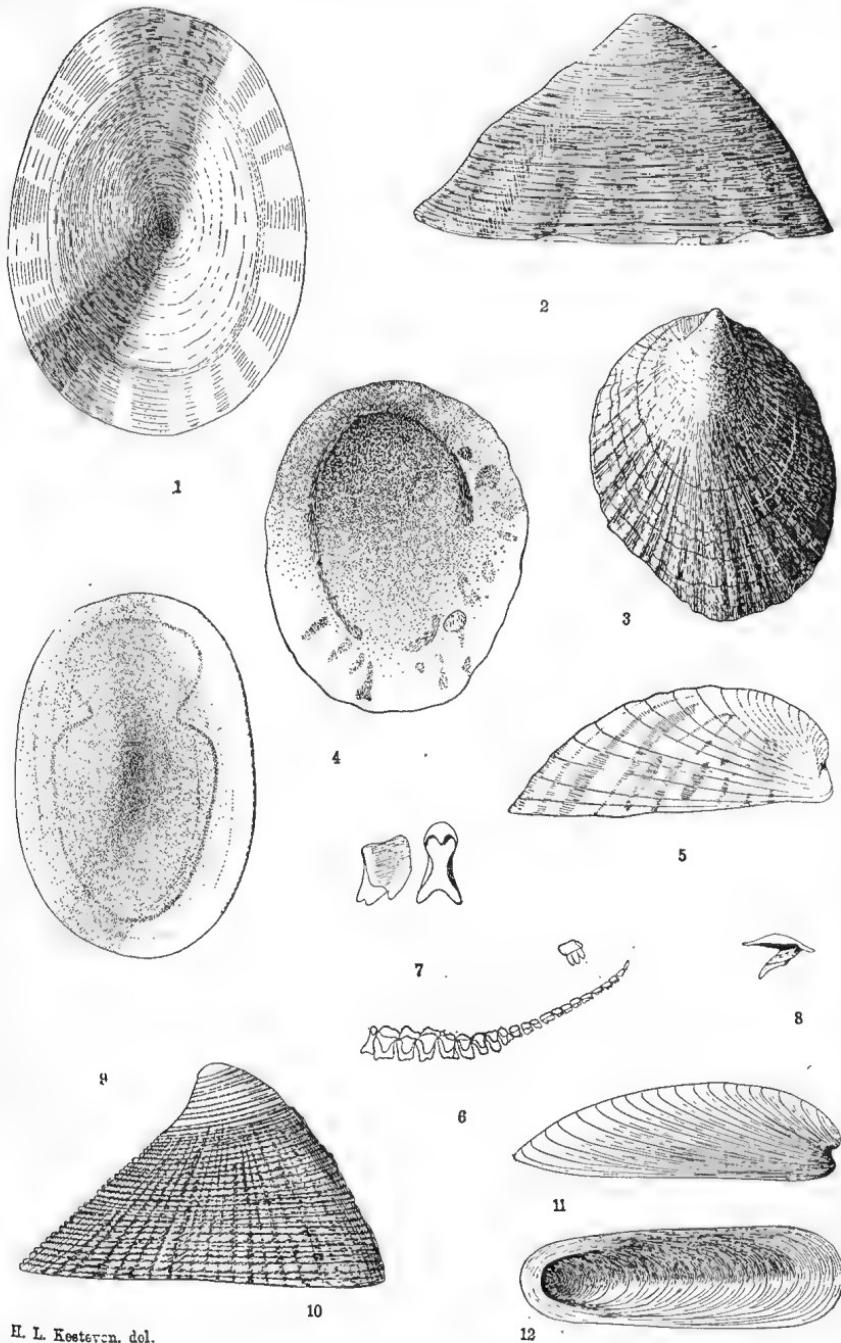
- Fig. 1. *Scutellina alboradiata*, Verco.—Ventral view.  
 " 2. " " Side view.  
 " 3. *Siphonaria stowæ*, Verco.—Dorsal view.  
 " 4. " " Ventral view.  
 " 5. " " Side view.  
 " 6. " " Radula.  
 " 7. " " Radula, rachidian, and first lateral from the other half.  
 " 8. " Fifth lateral, side view.  
 " 9. *Scutellina calva*, Verco.—Ventral view!  
 " 10. " Side view!  
 " 11. *Nacella compressa*, Verco.—Side view.  
 " 12. " " Ventral view.

##### PLATE IX.

- Fig. 1. *Lippistes meridionalis*, Verco.  
 " 2. " Protoconch.  
 " 3. *Seguenzia polita*, Verco. " Lip in profile  
 " 4. " " Basal view.  
 " 5. " " Spire, full view.  
 " 6. *Lippistes separatista*, Dillwyn.—Spire, full view.  
 " 7. " " With epidermis.  
 " 8. " " Operculum.  
 " 9. " " Radula.

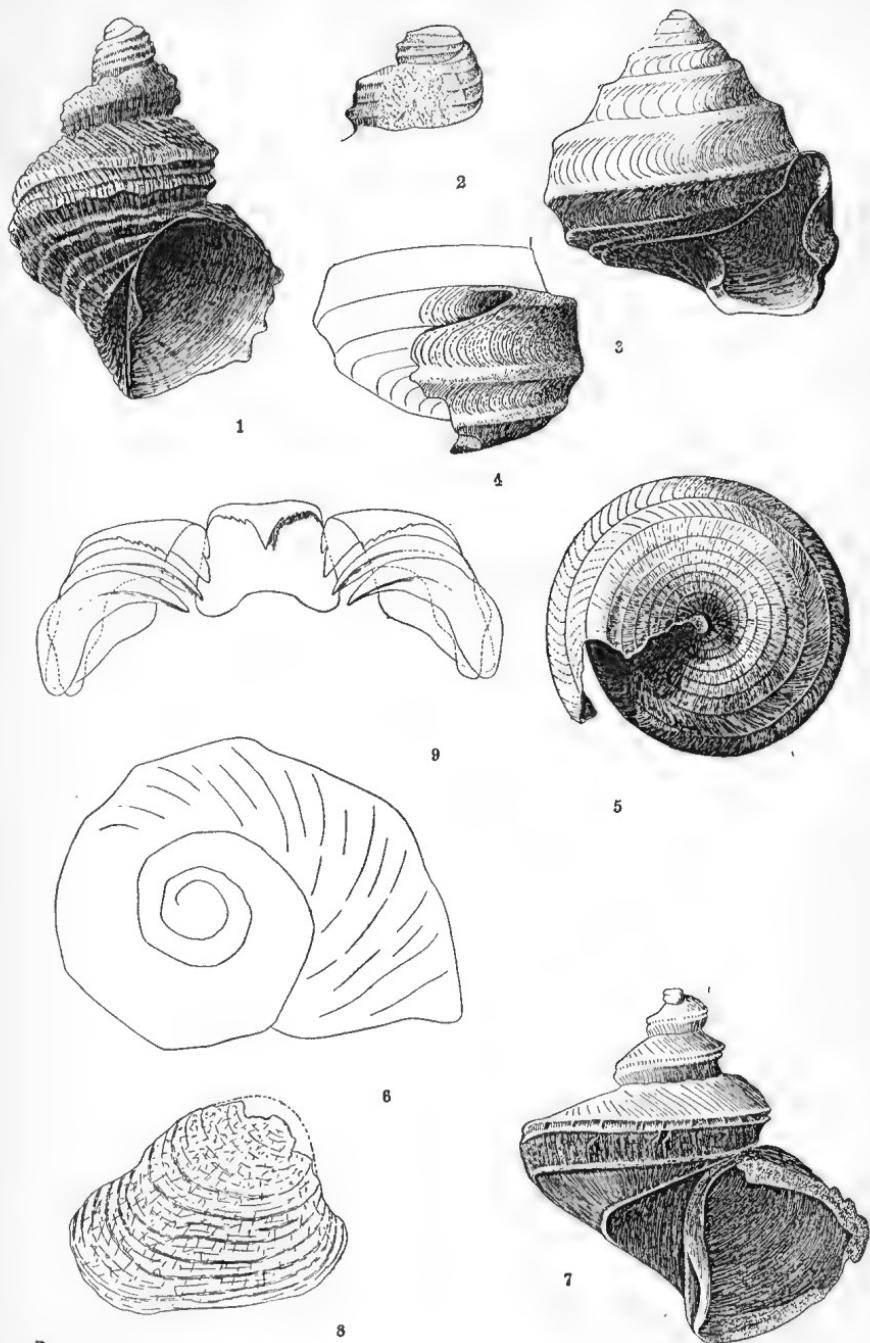
##### PLATE X.

- Fig. 1. *Basilissa radialis*, Tate, var. *bilix*, Hedley.  
 " 2. " " " " Base.  
 " 3. " " " " Outer lip.  
 " 4. *Nacella stowæ*, Verco.—Ventral view.  
 " 5. " " Side view.  
 " 6. *Helcioniscus illibrata*, Verco.—Side view.  
 " 7. " " " " Ventral view.  
 " 8. " " " " Radula, front view.  
 " 9. " " " " Laterals, side view.  
 " 10. " " " " Marginal, side view.  
 " 11. " " " " A second radula, front view.  
 " 12. " " " " Laterals, side view.  
 " 13. " " " " A third radula, front view.  
 " 14. " " " " A lateral, side view.



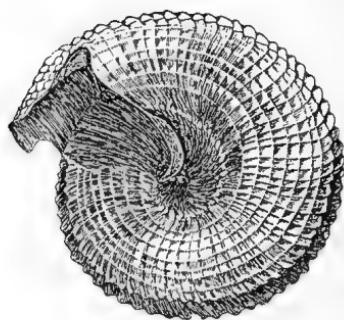
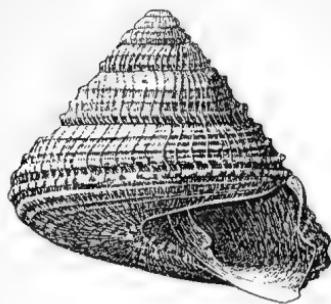
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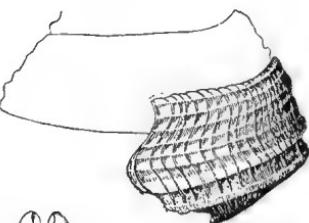


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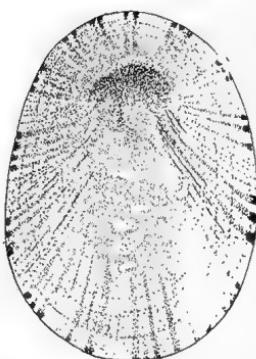




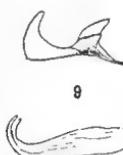
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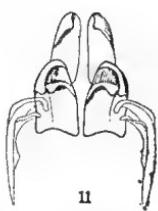
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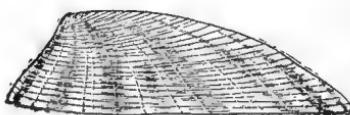
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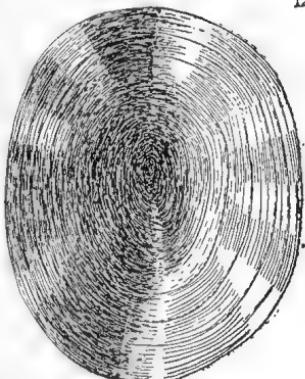
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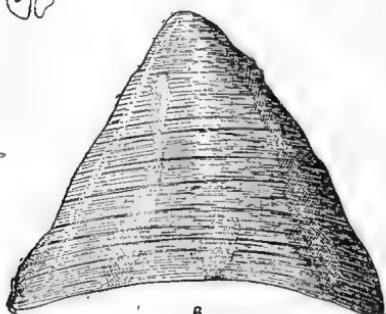


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H. L. Kesteven, del.

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99-110 Mai  
213-230 August  
305-315 September  
99

MAY 1904

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART V.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read May 7, 1907.]

During the last session in Adelaide of the Association for the Advancement of Science, Mr. Hedley, of the Australian Museum in Sydney, kindly examined, with me, a number of my South Australian shells, and has since compared them with types in the Sydney Museum. We have thus been able to identify several of our forms. He also took with him all my Pteropods, and returned them named. A trip to the three bays in the South-East of our State—MacDonnell Bay, Guichen Bay, and Lacepede Bay—provided a quantity of minute beach material, which has already proved to be very rich in novelties, and has provided examples of larger shells in such excellent condition as to allow one to speak more certainly upon some previously questionable points.

Family PATELLIDÆ, Guilding.

Genus PATELLA, Linnæus.

*P. ustulata*, Reeve.

This species was found in abundance by me this year on the rocks at Western Beach, Robe. Here and at MacDonnell Bay it was seen in better condition and in greater numbers on the vertical face of the rocks, just above low water, than on the submerged reefs, less eroded and less encrusted. A variant was taken at Robe, suggesting at first a new species, a rather narrow oval shell, with 22 to 24 large, rounded, close-set radial costæ, with one feeble or no interstitial riblet. They were found, however, to merge insensibly into the usual forms.

*P. hepatica*, Pritchard & Gatliff.

At Beachport, on the shore, several dead shells were collected, some quite typical, with oblong oval border, and crowded, fine, equal radial riblets. But, though retaining this outline, their sculpture gradates into the sub-distant costæ with intermediate riblets of *P. ustulata*, Rve. In one individual the sculpture is that of *P. hepatica* until it is 18 mm. long, when 24 valid white scaly ribs arise. Another shell, measuring 41 mm. by 36 by 20, is provided only with uniform crowded finely-scabrous riblets, combining the sculpture of *P. hepatica* with the shape and size of the largest of our *P. ustulata*. Every gradation, too, can be traced between the oblong-oval

and the roundly elliptical forms. The opinion expressed in Trans. Roy. Soc. South Aust., 1906, vol. xxx., p. 207, as to the identity of these two species is confirmed.

40 Genus *HELCLIONISCUS*, Dall. *Collana*  
*H. limbatus*, Philippi. *tramoserica*

*Putella limbata*, Philippi, Abbild. und Besch. Conch., vol. iii., p. 71, pl. iii., f. 2, 1849; Reeve, Conch. Icon., vol. viii., pl. xiii., f. 29, a, b, 1854; Angas, Proc. Zool. Soc. Lond., 1865, p. 185; Ten. Woods, Proc. Roy. Soc. Tasmania, 1877 for 1876, p. 48; also 1879 for 1878, p. 45; Pritchard & Gatliff, Proc. Roy. Soc. Vict., vol. xv. (new series), part 2, p. 192, 1903.

*Putella (Helcioniscus) limbata*, Phil., Pilsbry, in Tryon's Man. Conch., 1891, vol. xiii., p. 143, pl. lxxi., f. 53 to 56, and pl. xvii., f. 28, 29.

*Hab.*—That of the type is given by Philippi as "New Holland" (Largilliert); Reeve records it from "Signet Bay, North Australia: Dring"; Angas, "Port Lincoln, South Australia"; Ten. Woods, "Southport, Tasmania"; Pritchard and Gatliff, "Cape Otway, Victoria." It has been taken at the Neptunes and Thistle Island, and in Spencer Gulf by Dr. Torr; on Yorke Peninsula by Mathews; at Encounter Bay by myself. I did not find it at Kingston, Robe, Beachport, or MacDonnell Bay.

*Dim.*—The largest dimensions given by Ten. Woods are 71 mm. by 64 by 32; but one from Yorke Peninsula measures 77 by 64 by 33.

Philippi, Reeve, Angas, Pilsbry, and Pritchard & Gatliff regard it as a good species; but Ten. Woods in 1878 wrote: "I regard this shell as a variety, or not even a variety, of the preceding (*P. tramosericus*, Martyn). The somewhat broader ribs may distinguish it." Tate & May in their census of the Marine Moll. of Tasmania, Proc. Linn. Soc. of New South Wales, vol. xxvi., 1901, p. 141, accept this view. Among the shells collected by Dr. Torr in Spencer Gulf is a facsimile of Philippi's type figure, in shape, size, colour, and erosion. Others, up to 55 mm. in length, have the apex perfect. Instead of being yellowish they may be of a deep salmon tint, and instead of 32 may have only 22 ribs, much broader than in the type, and thus differ still more than this from *P. tramoserica*, Mart. On the other hand, a unicoloured salmon-tinted shell from Beard Peninsula, West Coast of South Australia, in its ribbing comes between both species; and a small shell from Encounter Bay in its shape and flat rounded ribs approaches *H. limbatus*, and yet in its 44 ribs and red, yellow, and black radial markings is allied to *H. tramosericus*. I lean to the view of identity with extreme variation; but my series is not very large, and does not furnish such gradations as to warrant an absolute conclusion.

Genus NAEELLA, Schumacher.

*Naccula* *N. parva*, Angas. 51

Hab.—One example dredged dead at 62 fathoms N.W. of Cape Borda: several found in shell sand, Guichen Bay, which is its most easterly known station.

*Asterocinea* *N. crebristriata*, Verco. 49

Hab.—The type locality was not exactly known, but was judged to be Moonta Bay. I have since taken several examples in shell-sand at Guichen Bay. There are variations from the type. The anterior slope may be sub-convex, or it may be slightly excavated immediately below the apex. Some are more compressed laterally than the type, others tend more to an elliptical outline. There may be about sixteen equidistant pink radii, or the shell may be uniformly of a light pink tint.

*Asterocinea* *N. stowæ*, Verco. 47

Hab.—Guichen Bay beach, in shell-sand. No variations from the type.

Family ACMÆIDÆ, Philippi.

Genus ACMÆA, Eschsholtz.

*A. flammea*, Quoy & Gaimard.

*Patelloidea flammea*, Q. & G., Voy. de l'Astrolabe, Zool., vol. iii., 1834, p. 534, pl. lxxi., f. 15 to 24.

My observations on this variable shell in Trans. Roy. Soc. South Australia, vol. xxx., 1906, p. 212, were almost entirely based on dredged shells. A collection since gathered from the rocks at Robe, Beachport, and MacDonnell Bay enables me to add something further. As a rule the exposed shells are much more eroded, and their ribs are ruder and less numerous, and they are of the *A. jacksoniensis*, Reeve, form rather than of the *A. crucis*, Ten. Woods. Many of these were much narrowed anteriorly, so as to be really oval or egg-shaped instead of uniformly roundly elliptical. Some of the smaller individuals tend also to be pyramidal rather than conical, with four obsolete angles occupying the situation of the intervals between the arms of the Maltese cross. None were found with radial ribbing so fine as presented on some of the dredged specimens.

In most the cross was plainly visible, or indistinctly when held up to the light. One showed the anterior and both lateral arms fused into one mass, and the posterior arm very broad, so as to give a quite black shell with two narrow dead white radii at the postero-lateral parts. Another was a black shell with four narrow white radii. Another had five

equal black arms, due to a white wedge in the centre of a wide posterior black patch. Another common peculiarity was that the white concentric band inside, just above the articulated dark and white border, had two radial extensions to the margin in the postero-lateral regions; and these, quite marked in the shells *with* the cross, were frequently distinct in those *without* the cross, and enabled the species to be certainly recognized.

Family COCCULINIDÆ, Dall.

Genus COCCULINA, Dall.

*C. coercita*, Hedley.

*Cocculina coercita*, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 289, pl. liv., f. 1, 2.

*Type loc.*—80 fathoms off Narrabeen, New South Wales; also 300 fathoms east of Sydney (Hedley). South Australia, one example at 130 fathoms off Cape Jaffa (Verco).

Family VERMETIDÆ.

Genus VERMICULARIA, Lamarck, 1799.

*V. Nodosa*, Hedley.

*Vermicularia nodosa*, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 292, pl. liv., f. 8.

*Type loc.*—80 fathoms off Narrabeen, New South Wales.

Dredged, 55 fathoms off Cape Borda, many; 150 fathoms off Beachport, one (Verco).

Family TRITONIDÆ.

Genus CYMATIUM.

*Cymatona* C. *kampylum*, Watson.

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*Nassaria kampyla*, Watson, Jour. Linn. Soc. Lond., vol. xvi., p. 594.

*Nassaria campyla*, Watson, Chall. Rep., vol. xv., 1886, p. 405, pl. xiv., f. 12. *Type locality*, "Off Sydney, 410 fathoms, green mud." *Lampusia nodocostata*, Tate & May, Trans. Roy. Soc., S. Austr., 1900, vol. xxiv., p. 90; *type locality*, east coast of Tasmania, 2 examples (W. L. May); also Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., p. 355, pl. xxiii., fig. 2; *Lotorium nodocostatum*, Tate & May, Kesteven, Proc. Linn. Soc. N.S. Wales, 1902, vol. xxvii., pp. 463, 479, f. 1, 4; *Cymatium kampyla*, Watson, Hedley, Records of the Austr. Mus., vol. vi., part 3, p. 213.

The species was taken by Mr. Hedley and others in abundance at 300 fathoms, off Sydney, and with this material he was able to identify the Tasmanian shell with Watson's species. In my dredging off Beachport and Cape Jaffa I took more than 750 examples, mostly immature, and all dead. They ranged from 90 fathoms to 300; and were most

common at 110, 130, and 200 fathoms. They appear to live at some greater depth, for the living example which formed the Challenger type was taken at 415 fathoms. Considerable variation from the type is seen. Its proportions are 1·67 inches long and ·8 broad, but these may be 1·45 and ·6, giving a much more slender shell. Some individuals are more solid than others, and these usually have bolder sculpture, in axial costæ and spiral liræ. This is very noticeable in the whorls following the protoconch; the first may be merely granulated, and the second show only obsolete radial and spiral sculpture. When there is any ornament it is seen as yellow-brown spiral bands between the raised liræ, generally three in the spire-whorls and about six on the body-whorl, the last two or three tending to fuse. They are interrupted by the varices, which remain white.

### Family SIPHONARIIDÆ.

Genus *SIPHONARIA*, Sowerby, 1824.

*S. diemenensis*, Quoy & Gaimard. *g/11*

*S. diemenensis*, Quoy & Gaimard, Voy. de l'Astrolabe, Zool., vol. ii., p. 327, pl. xxv., figs. 1-12, 1833; Reeve, Conch. Icon., vol. ix., pl. i., fig. 1, 1856; Ten. Woods, Proc. Roy. Soc. Tasmania, 1877, pp. 56 to 58; and 1878, p. 46; Adcock's Handlist of Aquatic Moll. of South Australia, 1893, No. 457; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 418; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 220.

*S. denticulata*, Quoy & Gaimard, *op. cit.*, p. 340, pl. xxv., figs. 19, 20; Reeve, *op. cit.*, pl. i., fig. 4; Ten. Woods, *op. cit.*, 1877, p. 54, 56, and 1878, p. 47; Adcock, *op. cit.*, No. 454.

*S. scabra*, Reeve. Conch. Icon., vol. ix., pl. i., fig. 2.

*Type loc.*—Of *S. diemenensis*, D'Entrecasteaux Channel, Tasmania (Quoy); of *S. denticulata*, "The southern part of New Holland at Western Port, and probably also at King George's Sound" (Quoy); of *S. scabra*, Port Jackson (Reeve).

*Obs.*—Tate & May and Pritchard & Gatliff unite the first two as one species, and the latter authors unite all three.

Our shell is very variable. It may be high and steeply conical, or so depressed as to have only a trace of cavity: rarely thin and delicate, generally of moderate thickness, sometimes quite solid. The ribs may be as few as 17 or very numerous, distant, or crowded; high, narrow, and sharp-cut, or low, broad, and rude; straight, smooth, and regular, or crooked, rough, irregularly noded, or scabrous. Rarely they are quite colourless, when taken alive; or yellowish, with faint smokiness in the intercostal spaces. They are brown throughout, or with bluish-white ribs and bluish-black between. But all these variations intergrade. It extends all along our coastline.

*S. baconi*, Reeve.

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*S. baconi*, Reeve, Conch. Icon., 1856, vol. ix., pl. vi., fig. 30; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 221.

*Type loc.*—“Swan River.”

The three shells from the Cuming Museum in the Natural History Museum (Brit. Mus.), London, from Swan River, labelled *S. baconi*, Reeve, are similar to ours. It was given in Adcock's Handlist, No. 455, as *S. luzonica*, Reeve; but the types of this species, and from which his figures were drawn, are from the Philippine Islands, and have only 9 to 13 ribs, much stouter than ours. *S. baconi* is probably the species catalogued by Tate & May in their Tasmanian Census as *S. albida*, Angas, in Proc. Linn. Soc. New South Wales, 1901, vol. xxvi., p. 419.

It has been taken from MacDonnell Bay to Streaky Bay, and up St. Vincent and Spencer Gulfs. It is found on the rocks in the South-East, which are completely exposed at low tide, and on the reefs which are not exposed; also on the ocean shore, subject to the rough seas from the break of the rollers, and the smooth water in the quiet bays and gulfs. The shells appear to be larger in the rougher South-East than in quiet places like Hallett Cove, etc. The size may reach 30 mm. by 23 by 5·5. They are very flat, as low as 4·75 mm. in a shell of 25 mm., the greatest height being 6 mm. in a shell of 20 mm. They are mostly roundly elliptical, rarely nearly circular, more rarely oblong-elliptical. Usually they are quite thin, but those from rough water may be very solid. Generally much eroded, especially when senile, they may show no sculpture. There may be only 17 to 20 ribs standing up validly above all secondary riblets, or there may be 44 nearly equal radii. Their colour is a dull white, rarely yellow. In some, especially in juveniles, or the earlier portions of mature ones, and in the thinner forms, tiny blackish or brownish spots may be scattered about irregularly, sparsely, or abundantly, or they may form clouds, rings, or patterns. The interior is quite white, the horseshoe amber-coloured. Sometimes within the horseshoe, and in a depression in front of it, and along the siphon furrow, is a fuscous clouding. The animal is of a light saffron-yellow colour.

*S. albida*, Angas.

*S. albida*, Angas, Proc. Zool. Soc., Lond., 1878, p. 314, pl. xviii., figs. 16, 17; Adcock, Handlist, etc., 1893, p. ii., No. 456.

*Type loc.*—St. Vincent Gulf, South Australia.

I examined the shell at the Natural History Museum (Brit. Mus.), London, in 1899. It was mounted as “Type

Adelaide." I could not match it; it is more conical than any *S. baconi*, Reeve, I had or have since obtained. It is very thin, but is evidently not a worn shell, and is very glistening internally. It must be an extreme variant if it be *S. baconi*. May it be an albino of one of the forms of *S. diemenensis*, Quoy?

*S. tasmanica* *S. zonata*, Tenison Woods. variation of 913  
*S. denticulata*, Quoy & Gaimard, var. *tasmanica*, Ten. Woods, Proc. Roy. Soc. Tasmania, 1877, p. 54; *S. zonata*, Ten. Woods, op. cit., 1878, p. 99, and p. 47; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 221.

It was listed by Tate and May in their Census for Tasmania, as *S. tristensis*, Sowerby, in Proc. Linn. Soc. New South Wales, 1901, vol. xxvi., pt. 3, p. 419, by misidentification.

It is found at MacDonnell Bay on the rocks above low water, and at Beachport, mostly much eroded. But perfect specimens may attain full size of 22.5 mm. by 19.5 by 9, and may show a perfect protoconch of a deep brown colour, hooked backwards, and spirally curved, with the nucleus of a deep amber tint deviated to the left, on which side alone its two whorls, quite distinct, smooth, round, and slightly elate, are visible.

*Pugillaria* *S. stowæ*, Verco. 914

*S. stowæ*, Verco, Trans. Roy. Soc. South Austr., 1906, vol. xxx., p. 223, pl. viii., figs. 3 to 8.

Type loc.—Pondolowie Bay, Spencer Gulf. The habitat has not been extended beyond Encounter Bay.

#### Family GADINIIDÆ, Gray.

Genus GADINIA, Gray, 1824.

*G. angasi*, Dall. *albida*

*Gadinia canica*, Angas, Proc. Zool. Soc. Lond., 1867, p. 115, No. 27, pl. xiii., fig. 27. Type locality, "Port Jackson Heads (Coll., Angas)"; also p. 220, No. 221, "Coodgee Bay."

*Gadinia angasi*, Dall, Amer. Jour. Conch., 1870, vol. vi., p. 11; Pritchard & Gatliff, Proc. Roy. Soc. Vict., vol. xv. (n.s.), part 3, p. 222, "Portsea, Port Phillip; Western Port."

Taken on the ocean beach at Port MacDonnell, Beachport, and Robe, not rare, and in good condition (Verco); Head of Great Australian Bight (Tate); Rosetta Head, Encounter Bay (Tate).

#### Family MODIOLARCIDÆ, Gray.

Genus MODIOLARCA, Gray.

*M. tasmanica*, Beddome. *littoralis*

*Modiolarca tasmanica*, Beddome, Proc. Roy. Soc. Tasmania, 1881, p. 168; Cloudy Bay, South Bruny Island, and off Brown's River; Tate & May, Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 439, Text, fig. 12.

It was found by me in Guichen Bay, in a small sandy cove between two rocky prominences, which projected into the sea. Just beyond the margin of the receding wave it formed an abundant dark reddish-brown shifting sediment, with tiny fragments of brown seaweed. It was scooped up in hundreds with a spoon, mixed with *Philippiella crenatulifera*, Tate, and *Neolepton rostellatum*, Tate. It had not previously been recorded for South Australia. It was taken also in Lacepede Bay in numbers, and in small quantity at MacDonnell Bay.

Family MYTILIDÆ, D'Orbigny.

Genus MODIOLA, Larnarck.

*M. linea*, Hedley. *Modiola linea*.

*Modiola linea*, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 300, pl. lvi., figs. 23, 24, 25.

Type loc.—80 fathoms off Narrabeen, New South Wales.

Dredged, 104 fathoms, 35 miles S.W. of Neptune Islands, 34 valves, 1 alive (Verco).

Family LEPTONIDÆ, Gray.

Genus NEOLEPTON, Monterosato.

*N. rostellatum*, Tate. *N. rostellatum*.

*Kellia rostellata*, Tate, Trans. Roy. Soc. South Austr., 1888 (1889), vol. xi., p. 63, pl. xi., fig. 14. Type loc., Port Phillip Heads, Victoria, dredged alive, 7 to 9 fathoms, attached to seaweed; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., p. 432, King Island.

*Neolepton rostellatum*, Tate, Hedley, Pros. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., part 4, p. 542, pl. xxxi., figs 3, 4.

Taken in numbers alive at the water's edge in Guichen Bay, also in shell-sand in Lacepede Bay, and at MacDonnell Bay. Not previously recorded for South Australia.

BRACHIOPODA.

*Cryptopora brazieri*, Crane.

*Atretia brazieri*, Crane, Proc. Zool. Soc., 1886, p. 183.

*Cryptopora brazieri*, Crane, Hedley, Proc. Linn. Soc. N.S. Wales, vol. xxxi., part 3, p. 467, pl. xxxvi., figs. 1, 2, "Common at 17 to 20 fathoms around Masthead Island, Queensland, on the polyzoan, *Selenaria maculata*, Busk."

Dredged 104 fathoms, 35 miles S.W. of Neptunes, 33 examples; 62 fathoms N.W. of Cape Borda (Verco).

PTEROPODA.

No Pteropods have hitherto been recorded from South Australian waters. The "Challenger," after leaving South Africa, worked in high southern latitudes, then made direct

for Melbourne, and dredged thence to Sydney. Several species belonging to this class were thus listed for the Victorian and New South Wales coasts, but none for South Australia. My dredgings during the last few years off the shores of South Australia have yielded seven species of Pteropods belonging to three different genera. The shallowest water in which they were taken was sixty-two fathoms. They were found at all intermediate depths down to 300 fathoms, which was the limit of my operations. No specimens were taken alive, but only their glass-like shells. I am indebted to Mr. C. Hedley, F.L.S., for their identification. "The Challenger Reports, vols. xix. and xxiii." ; and "The Catalogue of Marine Shells of Australia and Tasmania, pt. 2, Pteropoda, by John Brazier, C.M.Z.S., F.L.S., Australian Museum, Sydney (Catalogue No. 15), 1892," will supply the synonymy of the species and their habitat.

Family LIMACINIDÆ, Gray.

Genus LIMACINA, Cuvier.

*L. inflata*, D'Orbigny.

*Atlanta inflata*, d'Orbigny, Voyage dans l'Amerique méridionale, vol. v., p. 174, pl. xii., figs. 16, 19, 1836.

Station.—62 fathoms, N.W. of Cape Borda, several; 104 fathoms, S.W. of Neptune Islands, many.

Family CAVOLINIIDÆ, D'Orbigny.

Genus CAVOLINA, Abildgaard.

*Diacria trispinosa*, Lesueur.

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*Hyalaea trispinosa*, Lesueur, M.S., in de Blainville, "Hyale, Dict. d. Sci. Nat.", vol. xxii., p. 82, 1821.

Stations.—90 fathoms, off Cape Jaffa, 5 examples, 300 fathoms 10; 100 fathoms off Beachport 1, 110 fathoms several, 150 fathoms 2; 104 fathoms off the Neptunes, many.

*Cavolina c. tridentata*, Forskål.

*Anomia tridentata*, Forskål, Descriptiones animalium quae in itinere orientali observavit, p. 124, 1773.

Stations.—Off Beachport, 110 fathoms, several broken, 150 fathoms, 2 broken; off Cape Jaffa, 130 and 300 fathoms, at each one whole and a few broken; off the Neptunes, 104 fathoms, 2.

*C. inflexa*, Lesueur.

*Hyalea inflexa*, Lesueur, Memoire sur quelques animaux mollusques, etc., Nouv. Bull. Soc. Philom., vol. iii., p. 285, pl. iii., fig. 3, 1813.

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Station.—Off Neptunes, 104 fathoms, 1.

## Family CLIIDÆ.

Genus CLIO, Browne.

*Styliola* **subula**, Quoy & Gaimard. *898**Cleodora subula*, Quoy & Gaimard, Observations Zoologiques faites à bord de l'Astrolabe, Ann. d. Sci. Nat., Ser. 1, vol. x., p. 223, pl. viii., D, figs. 1, 3, 1827.*Stations*.—62 fathoms, N.W. of Cape Borda, many; 104 fathoms, 35 miles S.W. of Neptunes, many; 130 fathoms, off Cape Jaffa, 6; 300 fathoms, off Cape Jaffa, very many.**C. pyramidata**, Linné.*Clio pyramidata*, Linné, Systema Naturæ, Ed. 12, p. 1094, 1767.*Stations*.—90, 130, and 300 fathoms, off Cape Jaffa; 104 fathoms, 35 miles S.W. of Neptunes.**C. balantium**, Rang.*Cleodora balantium*, Rang, Magasin de Zoologie, 1834, pl. xliv.*Stations*.—110 and 150 fathoms, off Beachport, several fragmentary; 130 and 200 fathoms, off Cape Jaffa, several fragmentary.

## PELECYPODA.

## Family CRASSATELLITIDÆ.

Genus CYAMIMACTRA, Bernard.

**C. mactroides**, Tate & May.*Cyamium mactroides*, Tate & May, Trans. Roy. Soc. South Austr., 1900, vol. xxiv., p. 102. *Type locality*, Tasmania (W. F. Petterd); Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 433, pl. xxvii., fig. 103.*Cyamiomactra mactroides*, Tate & May, Hedley, Proc. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., part 4, p. 541, pl. xxxi., figs. 9, 10, giving variations, figuring shell and hinge, and supplying additional localities, Victoria, N.S. Wales, and Queensland.

Taken in great numbers, alive and dead, in deep water, St. Vincent and Spencer Gulfs (Verco).

**C. communis**, Hedley.*Cyamiomactra communis*, Hedley, Proc. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., p. 541, pl. xxxi., figs. 11, 12, 13. *Type locality*—Manly Beach, near Sydney (Miss L. Parkes), Port Fairy, Victoria (Whan).

Found in numbers in shell-sand at MacDonnell Bay, and at Guichen Bay (Verco).

Genus CUNA, Hedley, 1902.

**Cuna delta**, Tate & May.

*Carditella delta*, Tate & May, Trans. Roy. Soc., S. Austr., vol. xxiv., 1900, p. 102. *Type locality*—Derwent Estuary, Tasmania (W. L. May); Hedley, Records Austr. Mus., vol. iv., No. 1, 1901, p. 23, figs. 5a, b, dredged off N.S. Wales, in 35 fathoms; Tate and May, Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 434, pl. xxvii., figs. 100, 101; *Cuna delta*, Tate & May, sp., Hedley, Memoirs Austr. Mus., vol. iv., part 5, 1902, p. 316.

Dredged in deep water, St. Vincent Gulf and Backstairs Passage, several alive and dead (Verco); Aldinga (Kimber).

**C. concentrica**, Hedley.

*Cuna concentrica*, Hedley, Memoirs Austr. Mus., vol. iv., 1902, p. 315, fig. 55. *Type locality*—Port Kembla, 63-75 fathoms; Hedley, Records Austr. Mus., vol. vi., part 2, 1905, p. 42, 111 fathoms, off N.S. Wales.

Dredged in 20 fathoms, Backstairs Passage, many examples (Verco).

Family CONDYLOCARDIIDÆ, Bernard.

Genus CONDYLOCARDIA, Bernard.

**C. ovata**, Hedley.

*Condylocardia ovata*, Hedley, Proc. Linn. Soc. N.S. Wales, 1905, part iv., vol. xxx., p. 539, pl. xxxi., figs. 5, 6. *Type locality*—Manly Beach, in shell sand (Miss L. Parkes).

St. Vincent Gulf, deep water, many complete and valves (Verco); identified by Hedley from his type.

**C. trifoliata**, Hedley.

*Condylocardia trifoliata*, Hedley, Moll. Masthead Reef, Queensland, part 1, Proc. Linn. Soc. N.S. Wales, 1906, vol. xxxi., part 3, p. 475, pl. xxxvii., figs. 20 to 23. *Type loc.*—Several alive from 17-20 fathoms. Also Middle Harbour, Sydney.

Many were obtained by me some years ago in dredge-siftings from Backstairs Passage and St. Vincent Gulf. Though so minute, less than 1½ mm., the young shells may be found within them.

Family VENERIDÆ.

Genus GAFRARIUM (CIRCE).

**G. angasi**, Smith.

*Gouldia australis*, Angas, Proc. Zool. Soc. Lond., 1865, p. 459; 1867, p. 928.

*Circe australis*, Angas, Smith, *op. cit.*, 1881, p. 491.

*Circe angasi*, Smith, Challenger Reports, Zool., vol. xiii., 1885, p. 148, pl. ii., figs. 4 to 4e. *Hab.*—Port Jackson, N.S. Wales, 2 to 10 fathoms.

*Gafrarium angasi*, Smith, Hedley, Moll. of Masthead Reef, Queensland, Proc. Linn. Soc. N.S. Wales, 1906, vol. xxxi., p. 466.

Dredged alive at 17 fathoms, St. Vincent Gulf and Back-stairs Passage, 4; at 18 fathoms, Investigator Straits, one example; at 45 fathoms, east of Neptune Islands, 1, and 4 valves; at 17 and 22 fathoms, many valves; in Spencer Gulf, unrecorded depth, 1 alive, and 6 valves (Verco).

*Var.*.—Only one individual of a pale tint has the typical radial rays; most shells are of a pinkish chestnut, especially at the umbos, disposed in dark and light concentric bands; some are deep reddish-brown at the umbos and along the post-dorsal and ventral margins, and have no concentric bands; others are white.

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1907 August  
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NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART VI.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxi., 1907.]

[Read August 6, 1907.]

PLATES XXVII. and XXVIII.

*see also Molluscs Part II*

**Sepia braggi, sp. nov.** Pl. xxvii., figs. 6, 6a, 6b, 6c, 6d.

The animal from which this cuttlebone comes is unknown. It is 60 mm. long by 11 mm. broad at its widest part, with a maximum thickness of 4·75 mm. The dorsal surface is very slightly convex in its anterior two-thirds, but markedly curved in the posterior third. The mucro of 2·75 mm. in length projects at an angle of about 135°. The maximum width and thickness is at 20 mm. from the anterior end, which is sharply rounded. Posteriorly it uniformly narrows to a minimum of 3 mm., and at its extreme end terminates in a thin circular expansion, 4 mm. in diameter, which extends about 1·5 mm. beyond the base of the projecting spine.

An orange-coloured line arises at the margins at the point of maximum width, and becomes plainer and wider as it extends backwards, and more prominent ventrally till it projects nearly a millimeter in height, and is half a millimeter in width at the posterior end of the white substance, around which it circles. A longitudinal central furrow, deepest just in front of the widest part of the shell, grows shallower and wider anteriorly, and nearly vanishes at the posterior end. Dorsally a very low rounded central rib increases posteriorly to a width of 3 mm., and midway between it and the margins of the bone is a scarcely perceptible longitudinal depression.

Its nearest ally is *S. elongata*, Fer and Orb, Céph Seiches, t. 24, f. 7-10, 1839; Tryon, Man. Conch., vol. i., p. 195, pl. xci., figs. 418, 419. *Hab.*, Red Sea. The animal of that species is also unknown. The sepiostaire as figured in Tryon is only 45 mm. long, is less attenuated posteriorly, has a comparatively wider hollow expansion at the posterior end, is curved for a much shorter length posteriorly, and has its spine not set at an angle, but curving backward, so as to continue the nearly straight dorsum of the bone. The chalky substance, too, seems much thicker, and to more suddenly decrease forward. The dimensions are not given in Tryon's text.

*Hab.*—The type was found at Glenelg by Master Bragg, and we have pleasure in naming it after him, and at the same time complimenting his father, Prof. Bragg, one of our most honoured Fellows, who has just been distinguished by the Fellowship of the Royal Society of London.

Mr. Zietz has also taken eight specimens during ten years' collecting on our beaches; so that it is a rare species here.

Mr. Hedley says it does not seem to occur on the Pacific coast of Australia, but he has it from Victoria.

**Arcularia dipsacoides**, Hedley. Pl. xxix., fig. 13.

*Arcularia dipsacoides*, Hedley, Records Austr. Mus., vol. vi., part 5, 1907, p. 359, pl. lxvii., f. 21. Type locality, 800 fathoms 35 miles E. of Sydney.

Dredged off Cape Jaffa, in 130 fathoms, 41 examples; in 300 fathoms, 10, all dead.

Two individuals were taken alive in 130 fathoms, off Cape Jaffa, and furnished radulæ. They contain about fifty-three rows, and are of the ordinary rachiglossa type. A large lateral with two well-curved simple cusps fold over a rachidian tooth with ten cusps, of which the outermost on each side is very small. In one individual, one cusp situated at the centre is the largest and has frequently five cusps on one side and four on the other. In the second individual, the middle two are largest. The rest vary very much in relative length in different rows, so that scarcely any two rachidian teeth exactly correspond.

**Vermicularia flava**, n. sp. Fig. 1. 308



FIG. 1.

Shell an ochre-yellow-coloured tube, varying in diameter from 1 to 1·5 mm., moderately thick, coiled in flat discs of 5 or 6 mm. in diameter, each formed of three or four spirals; the discs are superimposed to form a cylinder. Section of tube circular. Surface has sinuous growth-lines, Ante-current at the margins of attachment to adjacent coils and at the centre of the free surface, varying in validity, sometimes erected into a collar. The anterior end stands free.

The type, after forming a flat cylinder of two discs, produces two more discs at right angles to these, and then has a free tube of 7 mm. length. The discs may be formed from the centre outwards, or from the circumference inwards. The

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free portion may be 15 mm. long. No nucleus has been seen.

Type locality.—130 fathoms, off Cape Jaffa; also in 90 fathoms, 37 dead; in 40 fathoms, off Beachport, one dead.

*Terebriphora Mangilia spica*, Hedley.

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Records of the Austr. Mus., vol. vi., pt. 4, 1906, p. 297, pl. lv., fig. 20. Type locality, off Narrabeen, N.S.W., 80 fms., 2 examples, 100 fms., off Wollongong 1.

Dredged at 40 fathoms, off Beachport, one dead; and at 110 fathoms, one dead.

The South Australian shells vary from the type in having six spirewhorls instead of four; and the four earlier whorls are not quite so long as those which form the spire of the type, the axial ribs are more numerous, and are less marked below the suture.

*Bathytroma Driftia hecatorguia*, n. sp. Figs. 2 and 3.

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Shell small, stout, biconic, whorls six. Protoconch flat, two smooth convex turns. Spirewhorls with a sharp medial angulation, undulated by pliciform tubercles (nine in the penultimate) plicæ reaching the lower suture; suture slightly adpressed. Growth-lines microscopic. Bodywhorl half as long as the shell; excavated below the suture, then acutely angled; faintly concave immediately below the angulation, then scarcely inflated, and next roundly contracted in the lower third. Tubercular plicæ wide, extend from the angle, soon become obsolete. Growth-lines faint, rude near the aperture. Sinus half as deep again as wide, bounded by the angle. Aperture oblique, length nearly four times its width, elongate-oblong. Outer lip simple, thin, convex. Columella convex in posterior half, straight anteriorly. Inner lip thin, applied, slightly spread, extending to suture. Anterior notch moderately wide. Colour translucent white, faintly tinged with brown.

Dim.—Length, 6·1 mm.; breadth, 2·8 mm. Length of aperture, 3·2 mm. The largest example is 7 mm. long.

Type Locality.—104 fathoms, 35 miles south-west of Neptune Islands; 28 dead.

*PRONucula micans*, Angas. F 12 *Bivalve*

*Nucula micans*, Angas. Proc. Zool. Soc., Lond., 1878, p. 864, pl. liv., f. 16. Type locality, shell sand, Salt Creek; Glenelg, St.



FIG. 2.



FIG. 3.

Vincent Gulf: Tate, Trans. Roy. Soc., South Australia, 1887, vol. ix., p. 102, No. 125; Tate and May, Proc. Linn. Soc., N.S. Wales, 1901, vol. xxvi., part 3, p. 435, "Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xvii. (N.S.), part 1, p. 237, "Victoria."

*Locality.*—Taken on the beach at MacDonnell, Rivoli, and Guichen Bays; many dredged alive in 5 fathoms, St. Vincent Gulf, and in 20 fathoms Backstairs Passage; valves dredged in Spencer Gulf, and also in 40 and 150 fathoms off Beachport, and one valve in 130 fathoms off Cape Jaffa.

***Nucula beachportensis*, sp. nov.** Pl. xxvii., fig. 3. *Bivalve*

Oval-trigonal, moderately solid. Umbos prominent, inflated, slightly opisthogyre, incurved. Teeth about thirteen anterior, solid and curved; six posterior. Fossa for the internal cartilage rather small, directed forwards and inwards. Dorsal border very slightly excavate just behind the fossa, then convex, then straight to the posterior inferior angle; ventral border with a uniform curve, joining with a smaller curve the anterior dorsal border, which has a very slight convex arcuation, and is about twice as long as the posterior. Inner ventral margin minutely crenulate.

*Sculpture.*—Smooth, but for obsolete rounded concentric striae at irregular distances, and scanty microscopic radial striae.

*Dimensions.*—Umbo-ventral, 4·6 mm.; antero-posterior, 4·9 mm.

*Locality.*—Dredged off Beachport, 40 fathoms, 1 perfect (type), 2 valves; in 100 fathoms, 1; 150 fathoms, 2; 200 fathoms, 1; off Cape Jaffa in 130 fathoms, 1; 300 fathoms, 6; all dead.

*Diagnosis.*—It is very like *N. micans*, Angas, but is a larger shell, is smoother, is not so uniformly rounded behind, but is truncated or straight from the end of the hinge to the ventral border, and the crenulations are fewer and more valid.

***Nucula obliqua*, Lamarck. *Bivalve***

*Nucula obliqua*, Lamarck. Anim. s. Vert., 1819, vol. vi., p. 59; Chenu, Man. Conch., vol. ii., 1862, p. 179, f. 897; Hedley, Mem. Austr. Mus., 1902, iv., p. 292. *N. tumida*, Ten. Woods. Proc. Roy. Soc. Tasm., 1877 (1876), p. 111 (*non* Phillips, Illus. Geol. Yorkshire, 1836, part 2, pl. v., f. 15; *nec* Hinds, Proc. Zool. Soc., Lond., 1843, p. 98). Type locality, Eocene fossil, Table Cape, Tasm. *N. tenisoni*, Pritchard, Proc. Roy. Soc. Vict., 1896, vol. viii., p. 128.

Dredged off Cape Jaffa, in 90 fathoms, 1 valve; in 130 fathoms, 16 valves; in 300 fathoms, 1 alive, small, and 3 valves; off Beachport, in 110 fathoms, 34 valves; in 150 fathoms, 19 valves; in 200 fathoms, 24 valves.

*Leda crassa*, Hinds.*Bivalve*

*Nucula crassa*, Hinds, Proc. Zool. Soc. Lond., 1843, p. 99. Type locality, Australia; *Leda crassa*, Hinds, Sowerby, Thes. Couch., vol. iii., 1860, p. 120, pl. 228, f. 69; Sowerby, Conch. Icon., 1871, vol. xviii., pl. 5, f. 27; Angas, Proc. Zool. Soc. Lond., 1877, p. 193; Ten Woods, Proc. Roy. Soc. Tasm., 1878, p. 32; E. A. Smith, Chall., Zool., 1885, xiii., p. 237; Tate, Trans. Roy. Soc. South Austr., 1887, ix., p. 102, No. 126; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, xxvi., pt. 3, p. 435; Hedley, Mem. Austr. Mus., 1902, iv., pt. 5, p. 294; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1904, xvii. (N.S.), pt. 1, p. 238. *Leda chuva*, Gray in Juke's Voy. Fly., 1847, vol. ii., app. p. 356, pl. ii., f. 6; Sowerby, Thes. Conch., 1860, iii., p. 119, pl. 228, f. 67; Sowerby, Conch. Icon., 1871, xviii., pl. 7, f. 46.

Dredged, Investigator Strait, 14 fathoms, 8 alive; off Middleton, 17 fathoms, many alive, adult; 18 miles off Newland Head, in 26 fathoms, 24 alive, mostly small, and great numbers of very small examples; off Beachport, in 110 and 150 fathoms, 3 and 4 valves (Dr. Verco).

*Leda dohrni*, Hanley.

*Leda dohrni*, Hanley, Proc. Zool. Soc. Lond., 1861, p. 242. Type locality, Mare Pacificum (Mus. Dohrn). *Id.* Hedley, Thetis Exped., Memoirs Austr. Mus., iv., pt. 5, 1902, p. 294. *Leda dohrni*, Hanley (A. Ad.), Sowerby, Conch. Icon., xviii., 1871, *Leda*, pl. lx, f. 54. *Leda hanleyi*, Angas, Proc. Zool. Soc., 1873, p. 174, pl. xx., f. 7; teste Hedley, loc. cit.

Dredged off Beachport, in 110 fathoms, 6 valves; in 150 fathoms, 10 valves; off Cape Jaffa, in 130 fathoms, 7 valves (Dr. Verco).

*Leda verconis*, Tate.

*Leda verconis*, Tate, Trans. Roy. Soc. South Austr., 1891, vol. xiv., p. 264, pl. xi., fig. 4.

Dredged alive in Spencer's Gulf, as far up as Wallaroo Bay, also in St. Vincent Gulf, in Investigator Strait, and Backstairs Passage. It occurs alive at all depths from 8 to 22 fathoms, being very numerous at 8, at 15, and at 22 fathoms. None were taken in the depths from 45 to 300 fathoms.

*Leda pala*, Hedley.

*Leda pala*, Hedley, Records Austr. Mus., vol. vi., part 5, 1907, p. 361, pl. lxvi., fig. 1. Type locality, 800 fathoms E. of Sydney.

Dredged off Cape Jaffa, in 130 fathoms, 2 valves.

*Leda miliacea*, Hedley.

*Leda miliacea*, Hedley, Thetis Exped., Mem. Austr. Mus. iv., pt. 5, p. 295, fig. 43; valves, 63-75 fathoms off Port Kembla, and 41-50 fathoms off Cape Three Points.

Dredged in 300 fathoms off Cape Jaffa, 5 valves (Dr. Verco).

*Poroleda ensicula*, Angas.*Bivalve*

*Leda ensicula*, Angas, Proc. Zool. Soc., 1877, p. 177, pl. xxvi., f. 27. Type locality, off Port Jackson Heads, 45 fathoms. *Id.*, Smith, Chall. Rep. Zool., xiii., 1885, p. 239. *Id.*, Hedley, Thetis. Exped., Mem. Austr. Mus., iv., pt. 5, 1902, p. 293, fig. 41. *Id.*, Pritchard & Gatliff, Proc. Roy. Soc. Vic., xvii. (N.S.), pt. 1, 1904, p. 239.

Dredged off Beachport, in 100 fathoms, 2 valves, in 110 fathoms 12 valves, in 150 fathoms very many valves, in 200 fathoms 8 valves; off Cape Jaffa, in 90 fathoms 5 valves, in 130 fathoms 6 valves; off Cape Borda, in 60 fathoms 2 valves.

*Sarepta obolella*, Tate.*Bivalve*

*Leda obolella*, Tate, Trans. Roy. Soc. S. Austr., vol. viii., 1886, p. 129, pl. v., figs. 3a and b. Type, a tertiary fossil from Muddy Creek. *Sarepta tellinæformis*, Hedley, Records Austr. Mus., 1901, vol. iv., p. 26, fig. 8; 75 fathoms 5 miles E. of Sydney Heads. *Sarepta obolella*, Tate; Hedley, Memoirs Austr. Mus., 1902, vol. iv., part 5, p. 295; off Port Kembla 63-75 fathoms, and Cape Three Points 41-50 fathoms.

Dredged off Cape Jaffa, in 300 fathoms, 1 whole, 6 valves.

*Limopsis tenisoni*, Ten. Woods.*F31*

*Limopsis cancellata*, Ten. Woods (*non* Reeve), Proc. Roy. Soc. Tasm., 1877 for 1876, p. 156. Type locality, north coast of Tasmania. *L. tenisoni*, Ten. Woods, Proc. Roy. Soc. Tasm., 1878 for 1877, p. 56; Hedley, Memoirs Austr. Mus., vol. iv., part 5, p. 297; Pritchard & Gatliff, Proc. Roy. Soc., Vic., 1904, vol. xvii. (N.S.), part 1, p. 245, "Victoria." *L. bassi*, E. A. Smith, Chall. Zool., 1885, vol. xiii., pp. 14, 256, pl. xviii., f. 6-6a, "East Monœur Is., Bass Strait, 38 fathoms"; Tate, Trans. Roy. Soc. S. Austr., 1887, vol. ix., p. 103, No. 136, "South Australia"; Tate and May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 437.

Is abundant throughout St. Vincent and Spencer Gulfs, Investigator Strait, and Backstairs Passage, being taken alive at all depths from 10 fathoms up to 30 fathoms. One example was taken alive from 55 fathoms off Cape Borda, and valves have been dredged at all depths up to 130 fathoms off Cape Jaffa; none beyond this depth.

It is a very variable species. Some individuals are almost orbicular, others are extremely oblique, some have the radial sculpture very valid, others obsolete. The epidermis may be smooth, silky, and uniform, or disposed in marked concentric fringes. The brown colouration may be very deep and general, or only in certain parts, or nearly absent. But any attempt to separate into different species is vain.

*Limopsis tenisoni*, Ten. Woods; var. *penelevis*, var. nov.

Pl. xxvii., fig. 5.

*F29*

Shell obliquely oval. Dorsal margin nearly straight. External surface with concentric growth lines, varying in

validity, somewhat imbricating; dotted at their convex margins by short, disconnected, sublenticular radial impressions, more marked over the posterior part of the shell, and as the shell grows larger. Internal margin non-crenulated and flattened. Tooth-plate rather curved; about 14 teeth. Milk-white.

*Dimensions*.—Umbo-ventral, 16.5 mm.; antero-posterior, 15 mm.; sectional of the closed valves, 5.5 mm.

*Locality*.—Valves dredged off Cape Jaffa and Beachport from 90, 130, 150, 200, and 300 fathoms.

It differs from the ordinary form in the almost complete absence of radial sculpture.

***Limopsis vixornata, sp. nov.*** Pl. xxvii., fig. 1. *F36*

Shell solid, white, equivalve, nearly equilateral, transversely orbicularly oval. Umbo acute, projecting well beyond the dorsal border, incurved. Inner margin smooth and flat. External surface smooth, but for concentric growth lines, which at fairly regular intervals are more valid, so as to form subdistant liræ. Under the lens traces of radial incisions are visible, especially over the posterior area. Cartilage pit triangular; 11 solid diverging teeth in a curved series. Interior closely radially striate.

*Dimensions*.—Umbo-ventral, 5.7 mm.; antero-lateral, 6.4 mm.; largest, 8.1 mm. by 9 mm. Some have a short, straight dorsal border, shorter anteriorly than posteriorly, and with the radial impressions rather more marked. One has an epidermis, worn away near the umbo, and projecting at the ventral margin for about a millimetre and a half as a continuous radially striated membrane, which on the surface of the shell breaks up into a hairy coating.

*Locality*.—Type from 45 fathoms, east of Neptune Islands, with 4 valves and 1 living specimen; from 49 fathoms, off Beachport, 23 valves; also at 55 and 62 fathoms, off Cape Borda, and 110 fathoms off Cape Borda.

*Diagnosis*.—The transversely oval shape, the prominent umbo, and the unsculptured surface separate it from *L. tenuis*, Ten. Woods; but possibly it is only a variant.

***Limopsis eucosmus, sp. nov.*** Pl. xxvii., fig. 2. *F30*

Shell solid, rather compressed, white, obliquely orbicular, slightly higher than wide. Umbos central, prominent, incurved approximate. Cartilage-pit small, triangular. Tooth-plate slightly curved; teeth, 5 anterior, 6 posterior, somewhat diverging. Inner margin flat and smooth. Interior obsoletely radially striate. Posterior muscle-scar large and long; anterior, short and narrow. Outer surface ex-

quisitely sculptured with flat concentric ribs, varying greatly in width, some twice, some four times as wide as the inter-spaces; others are only cords, not so wide as the intervals. They are higher on their convex than their concave edge. Numerous radial liræ, increasing by intercalation, scallop the ribs more markedly along their concave than their convex margin, forming circular depressions in the interspaces. At the anterior and posterior areas of the shell these scallops become triangular rather than circular, and so form lozenges in the interspaces. Where the radials cross the ribs, if these are very narrow, they produce a tubercle with a central radial furrow; if wide, they cross as a lira, with a central furrow, and sometimes another radial furrow is found on either side of this.

*Dimensions*.—Umbo-ventral, 8 mm.; antero-posterior, 7·5 mm.; section of closed valves, 3·25 mm.; largest example, 10·5 mm. by 10·3 mm.

*Locality*.—Type, off Cape Jaffa, from 90 fathoms, with 1 other valve; 35 miles south-west of Neptune Islands, from 104 fathoms, 62 valves.

***Limopsis erectus*, Hedley and Petterd. F35**

*Limopsis erectus*, Hedley & Petterd, Records Austr. Mus., vol. vi., part 3, p. 224, pl. xxxviii., figs. 14, 15. Type locality, 250 fathoms, off Sydney.

Dredged 35 miles south-west of Neptune Islands, 104 fathoms, 6 valves; off Beachport, 150 fathoms, 1 valve, 200 fathoms, 1 valve; off Cape Jaffa, 130 fathoms, 17 valves, and 300 fathoms, many small and mostly poor valves, but some with epidermis. The epidermis is abundant, of flaxen, bristly setæ, long towards the ventral border.

***Nuculina* (*Cyrilla*, A. Adams, s.g.) *concentrica*, n. sp. F10  
*Pronucula* Pl. xxvii., figs. 4, 4a, 4b.**

Minute, obliquely-oval, equivalvular, inequilateral, higher than long, moderately solid, white, smooth, with six concentric equidistant imbricating steps. Umbos prominent, prosogyre, incurved, approximate. The front side at the upper third is oblique and nearly straight, being faintly incurved; then rather suddenly roundly angulated, beyond which it is uniformly openly curved. The posterior side has a uniform gentle arcuation, and the basal outline is distinctly more sharply curved. The hinge-plate is broad. The teeth of the left valve lie in front of those in the right valve, and the left lateral tooth lies outside the right. There are six cardinal teeth in each valve, all behind a pit lying beneath and slightly in front of the umbo. The three nearest

the pit are nearly vertical and laminar, and rather close together; especially the first two; the posterior three become gradually more distant, stouter especially at their outer ends, shorter, and more diverging, lying perpendicular to the curving posterior margin. The last one in the right valve is peg-shaped. Behind, there is a rather long lamellar triangular tooth. The posterior muscle-scar is very large, curved, and oval, and placed low down beyond the lateral tooth. The inner margin is smooth and simple. The shell is covered with a dark-brown, smooth, shining, closely-adherent epidermis, which wears off dead shells, remaining last about the umbos. Dead shells are translucent, milky-white.

*Dimensions*.—Umbo-ventral diameter, 2·5 mm.; antero-posterior, 1·9 mm.; section of closed valves, 1·6 mm.; a large example is 3 mm. by 2·3.

*Habitat*.—104 fathoms, 35 miles south-west of Neptunes, many alive and dead, and valves.

Some Ostracoda, taken in the same haul, are very like them.

### Lissarca *pubricata*, Tate.

F 40

*Limopsis rubricata*, Tate, Trans. Roy. Soc. South Austr., 1886, vol. ix., p. 71, pl. v., fig. 6. Type locality, alive from 32 fathoms, Backstairs Passage; *op. cit.*, p. 104, No. 138; Tate and May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi.; part 3, p. 437, Pirate Bay, Tasmania; Hedley, Memoirs Austr. Mus., 1902, vol. iv., part 5, p. 297, valves, 41-50 fms., off Cape Three Points; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1904, vol. xvii. (N.S.), part 1, p. 246, Western Port.

Taken alive in Backstairs Passage, 17 fathoms; dead in St. Vincent Gulf, and off Cape Borda, in 62 fathoms, dead, but perfect. It is recorded from Cape Borda, round the coast of Victoria and Tasmania, to New South Wales.

Tate remarks:—"Probably a young shell, but not referable to any known species." Abundant material proves it to be full grown, and a distinct species. There are 5 radial flames, increasing in width as they diverge. Tate gives four.

### Lissarca *rhomboidalis*, n. sp.

Pl. xxvii., fig. 7.

F 3Y

Shell minute, solid, translucent, horn-coloured, ovate-rhomboid, equivalve, inequilateral, about twice as long behind the umbo as in front. Umbos prominent, round, wide, slightly prosogyre. Dorsal border faintly uniformly curved, continuing into the narrowly-rounded anterior end, and into a much more widely-curved posterior end, which is faintly truncated behind. There is a perceptible excavation where the anterior end joins the ventral border. A narrow subumbonal area, bounded outside by a straight, slightly prom-

inent rounded edge, is marked with numerous very close-set vertical striæ, and does not extend so far in front as behind, where it gradually narrows and vanishes. It is divided by a rather wide, shallow, subcentral triangular cartilage-pit. There are four anterior teeth perpendicular to the margin, and four posterior convexly curved towards the umbo; three or four small marginal teeth inside the anterior end, four at the post-dorsal margin, and three or four obsolete teeth at the post-ventral border. Margin otherwise simple. Posterior muscle-scar long, large, triangular. Crowded concentric, rather irregular accremental striæ, with very fine broken radial incisions.

*Dimensions*.—Antero-posterior, 2·4 mm.; umbo-ventral, 2 mm.

*Locality*.—MacDonnell Bay and Guichen Bay, in shell-sand.

*Variations*.—When dead they become white, the amber-colour disappearing first about the umbo, and last about the ventral margin. Some show four obscure rounded radial ridges, from the umbo to the posterior inferior angle; and these may crenulate the margin. Dorsally to these the shell may be somewhat hollowed. The posterior marginal teeth may crenulate the border, as may also the front teeth.

## *Microcucullae* *Bathyarca perversidens*, Hedley. F 28

*Bathyarca perversidens*, Hedley, Memoirs of Australian Mus., 1902, vol. iv., part 5, p. 298, fig. 45. Type locality, off Port Kembla, in 63-75 fathoms, etc. Var.—*Bathyarca cybæa*, Hedley, Trans. New Zealand Inst., 1903, vol. xxxviii., 1905, p. 70, pl. 1, figs. 3-4. Type locality, 110 fathoms, east of Great Barrier Island, New Zealand.

Dredged off Cape Jaffa, in 130 fathoms, 2 valves; in 300 fathoms, very many valves.

A series was submitted to Mr. Hedley as *B. cybæa*, and he kindly compared with his types and confirmed the identification. A suggestion was also put forward that his two shells were variants of one species, and he allowed that my series seemed to bridge the interval between the two. Being persuaded they are conspecific, I have named them *B. perversidens*, which has priority, making *B. cybæa* a variant.

In all my specimens the right valves have much more pronounced sculpture than the left, especially the radial. Some shells have the sinuation at the gape quite deep, with the depression from this to the umbo marked, others but slight, and others not at all. Some have quite a distinct angle at middle of the posterior side, where a straight-dorsal half meets the rounded ventral part; in others the posterior side is continuously curved.

It is interesting to note the very wide area of distribution of this small species: over 36 degrees of longitude and in almost identical latitudes.

*Denticosa*  
*Philobrya cuboides*, sp. nov. Pl. xxviii., figs. 5, 6, 7, 8, 9. F56

Shell minute, solid, subrhomboidal, inflated, equivalve, inequilateral, varying in different specimens. Anterior margin forming rather more than a right angle with the dorsal border, and straight for one-half its length, then sweeping with a large curve into the convex ventral margin. Posterior margin forming a more obtuse angle with the dorsal border, nearly straight throughout its whole length, and joining the ventral margin by a rounded angle. Umbos provided with adherent embryonal scales, which are thick, slightly more than a semicircle, their diameters almost opposed, their centres slightly prominent, the borders of their circumference, but not of their diameters, margined and slightly reflected. Infraumbonal ligamental area narrow and long. Hinge-line wide, of two parts joined at an open obtuse angle where it is narrowest. Cartilage-pit excavated in the ligamental area from the umbonal scale, directed obliquely backwards. Anteriorly to the pit are two stout, erect oblong teeth, directed backwards and inwards. Posteriorly are three stout, erect, nearly oblong teeth, directed almost transversely forwards and inwards.

*Sculpture*.—The surface has close-set, broad, low, radial ribs, and rather narrower concentric ribs, at about equal distances. The inner margin of the shell is denticulated; not at all, or only slightly on the straight parts.

*Dimensions*.—Umbo-ventral, 2·75 mm.; antero-posterior, 2·15 mm.; sectional of the closed valves, 1·5 mm.

*Locality*.—Backstairs Passage, 20 fathoms, 30 alive, many dead: Spencer Gulf, deep water, 13 alive.

*Obs.*—In life it is covered with a conspicuous thick periostracum, projecting as a hairy fringe along the ribs and beyond the margins. The shell is tinged throughout, or blotched with pinkish-brown.

*Variations*.—Typically the umbos are subcentral, rather nearer the anterior end of the hinge-line. In some specimens they are much nearer the front, when the cartilage-pit is longer and more oblique, and the whole shell is more oblique. The umbo-ventral diameter may be, in some instances, atypically greater than the antero-posterior. The dorsal border may be atypically short, and the dorso-lateral angles too obtuse, so as to give a circular rather than a quadrate outline to the margin of the shell.

Its exact generic location is somewhat doubtful.

*bednalli*

NEOTrigonia *margaritacea*, Lamarck, var. *bednalli*, var. nov. *Fyf*  
 Pl. xxviii., figs. 1, 2, 3.

*Trigonia margaritacea*, Lamarck, Ann. du Mus., vol. iv., p. 355, pl. lxvii., fig. 2. *T. pectinata*, Lamarck, Anim. S. Vert., 1819, vol. vi., p. 63; Encyc. Meth., 1832, vol. iii., p. 1048.

The shell here referred to was first taken on the South Australian shore, between Glenelg and the Semaphore, by Mr. W. T. Bednall, about the year 1865, and was catalogued by him in a list of South Australian shells, published (for private circulation only) in 1875, and was noticed in his excellent paper on "Australian Trigonias and their Distribution," in Trans. Roy. Soc. S. Austr., vol. i., 1878, p. 79, under the name of *T. margaritacea*, Lamarck. He said:—"Its particular habitats in our waters have not yet been discovered, no live specimens having yet been dredged." In vol. ix., pp. 101-102, Tate recorded it as having been "dredged in life from 8 fathoms in Encounter Bay (R. H. Pulleine)." A few years later, when I had the pleasure of Mr. Bednall's company on one of my earlier dredging excursions, we discovered it in St. Vincent Gulf, and obtained about 70 specimens, living and dead, from 15 to 20 fathoms, in Yankalilla Bay. Dredging since then has revealed a considerable range, both in depth and area, as shown by the following details:—It has been taken alive at 10 fathoms, 2 small examples: 12 fathoms, 7; 14 fathoms, 3; 15 fathoms, 3; 17 fathoms, 15; 19 fathoms, 16; 15 to 20 fathoms, about 50: 22 fathoms, 18. They have been taken as valves from 9 up to 200 fathoms. They have extended from Wallaroo Bay, at 15 fathoms, throughout Spencer Gulf, through Investigator Strait, in St. Vincent Gulf, as far up as Yankalilla Bay, and through Backstairs Passage. Beyond this, as far as Beachport, where I have only tested at depths from 49 to 300 fathoms, none but dead specimens have been obtained: though 1 example, the largest in my cabinet, perfect, and quite recent, and of a white colour, was brought up from 110 fathoms at this most easterly of my stations. Their zone is manifestly from 12 to 23 fathoms, only stragglers occurring at less depths, and dead shells at greater depths.

They are very varied in colour, white, pale yellow, light orange, delicate mauve, pink, "crushed strawberry," and purple.

This variety is characterized by its very compressed shape, its narrow ribs, its large, oblong, plate-like spines, broader at their free than at their attached ends, features which are exceedingly constant in the very large series obtained. *T. lamarekii*, var. *reticulata*, Ten. Woods, found off the coast of New South Wales, is regarded by Mr. Hedley

as the same species, as is also *T. acuticostata*, McCoy (Memcirs Austr. Mus., iv., part 5, 1902, p. 301).

The late Mr. Dennant kindly compared our South Australian shells with McCoy's fossil form from Victoria, and he thought they were not identical, nor conspecific with *T. reticulata*, Ten. Woods. However, I think it is too closely allied to be regarded as a distinct species, so it has been placed as a variety of *T. margaritacea*, Lamarck.

Among the many hundreds of valves and living specimens dredged by me, only 1 has shown any marked departure from the type of this variety. This was taken alive at 23 fathoms in St. Vincent Gulf, together with 2 others, which quite conformed to the type. This unique individual exactly resembled a half-grown specimen of the common *T. margaritacea*, Lam., obtained from Tasmania. The only other aberrant from our form seen by me is a specimen taken by Mr. Zietz, at Corny Point, Spencer Gulf. It has the spines of *T. margaritacea* and the same number of ribs, but the shape is more that of *T. lamarekii*, found in Port Jackson, only with fewer ribs and fewer spines, and with an even longer and more concave posterior border, in which last character it departs greatly from our South Australian variety. The occurrence of these two marked aberrants among numerous examples of the ordinary form indicates some other explanation for our variety than either locality or depth of water.

*Brechydonoulei* <sup>ss</sup>n. sp. Pl. xxviii., figs. 15, 16, 17, 18. FIII

Shell small, thin, ovate, ventricose. Beaks apposed, inflated, oblique. Post-dorsal line nearly straight, 11 mm.; anterior-dorsal line, 2 mm. Ventral border anteriorly slightly convex for 8 mm.; then rather more convex, and merging into the semicircular posterior end, which, with a more open dorsal sweep, forms a faint rounded angle with the post-dorsal line. A heart-shaped area, 10 mm. by 8 mm., on the united valves anteriorly is bare and glistening and sculptured with very low lamellar accremental striæ. The rest of the shell is very closely invested with a felted periostracum of short hairs, with short, blunt projections on each side. Internal border simple. Horn-coloured, lighter on the umbonal ridge. Internally chestnut-brown in front, and with pinkish-brown concentric bands, most marked, in the dorsal two-thirds, elsewhere a bluish-white.

Length, 21 mm.; breadth, 13 mm.; thickness, 11 mm.

It differs from *M. australis*, Lamarck, in its shorter, rounder, anterior end, its greater proportional breadth, and its rounder posterior end. Its hairs are more numerous and close-set, shorter, and "elk-horn" in shape, instead of simple.

*Habitat.*—Dredged alive in numbers in mud at 10 fathoms, off Banks Islands, and at 15 fathoms in Wallaroo Bay, Spencer Gulf.

*Glycimeris pectinoides*, Deshayes. Pl. xxviii., fig. 4. *F 144*

*Pectunculus pectinoides*, Deshayes, Cuv., Régn. Anim. (Fortin and Masson's illustrated edition), Moëlusques, pl. lxxxvii., f. 8. Illustrations Conchyliologiques, Chenu, *Pectunculus*, pl. ii., f. 2; Reeve, Conch. Icon. *Pectunculus*, pl. viii., f. 44. *Pectunculus gealei*, Angas, Proc. Zool. Soc. Lond., 1873, p. 183, pl. xx., f. 5. Type locality, off Port Macquarie, N.S. Wales. Tate, Trans. Roy. Soc. S. Austr., 1891, vol. xiv., part 2, p. 268; (*Glycimeris*), Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 436. *Pectunculus flabellatus*, Ten. Woods, Trans. Roy. Soc. Vict., 1878 (1877), vol. xiv., p. 61, 62. Type locality, Victoria and Tasmania: Tate, Trans. Roy. Soc. S. Austr., 1886, p. 103, No. 134: (*Glycimeris*), Pritchard and Gatliff, Proc. Roy. Soc. Vict., 1904, vol. xvii. (n.s.), part i., p. 243. *Pectunculus orbicularis*, Angas, Proc. Zool. Soc. Lond., 1879, p. 420, pl. xxxv., f. 9. *Pectunculus beddomei*, E. A. Smith. Chall., Zool., 1885, vol. xviii., p. 255, pl. xviii., f. 1, 1b.

Our South Australian shell was first recorded by Tate as *P. flabellatus*, Ten. Woods, in 1886; later as *P. gealei*, Angas, in 1891. The species figured by Chenu as *P. pectinoides*, Deshayes, and described and figured by Reeve as *P. pectenoides*, cannot be distinguished from a half-grown example of our shell. Reeve gives "Bay of Panama" as its locality, and says:—"After receiving from M. Deshayes the example of this species, originally described by him, Mr. Hinds supplied me with finer specimens from the collection of Captain Belcher." The habitat is far distant, but our shells appear conspecific.

It is not a common shell on our beach, but is fairly abundant in deeper water. It has been dredged in Spencer Gulf from Wallaroo Bay to Thorny Passage, in Investigator Strait, in St. Vincent Gulf, and through Backstairs Passage as far as Beachport. It has been taken alive at all depths between 8 and 30 fathoms, but is most numerous about 22 fathoms. Valves have been secured at all depths explored up to 150 fathoms off Beachport in decreasing quantities.

It is a very variable shell. When young it has an orbicular shape, being rather longer than high, and having a long, straight dorsal border. As it grows, it becomes higher than long, and its dorsal border is proportionally much shorter. It generally remains almost symmetrical; rarely it becomes quite decidedly oblique.

It may vary in obesity. One example, 41 mm. high, may be 30 mm. in section; another, 37 mm. high, may be only 20 mm. in section. The latter are of the compressed *P. bed-*

*domei* form. It is not explained by senility, for in young individuals an equal disparity is seen.

It may attain a height of 50 mm., a length of 51 mm., and a section of 35 mm.

The ribs differ. Generally they are broad and rounded, wider than the interspaces, which are deep and flat, with vertical sides. But sometimes the ribs are low and wide, and touch one another, so as to have no intervening squarely-ploughed furrow. The concentric sculpture usually consists of flattened contiguous plates on the ribs, while in the intercostal spaces there are low, vertical, thin lamellæ. But it may be no more than crowded concentric liræ, both on the costæ and between them.

The "lunular area" referred to by Angas is on the posterior side of the shell, and therefore does not correspond with the lunule of such shells as *Chione*. It may be very defined, or only slightly marked or absent.

Not a few individuals, after reaching a diameter of 25 mm., cease to grow in superficial area, but increase in sectional diameter, while they actually decrease in their umbro-ventral; so that their margin becomes curiously incurved and their walls very thick, as figured in pl. xxviii., fig. 4.

As to ornament, some shells in life are nearly white without and quite white within; others are of an almost uniform cinnamon-brown. The usual colour is a dirty-greyish or very faint rusty tint, with rather reddish-rusty indistinct blotches, disposed in irregular and broken concentric lines; but they may have a pure white-ground colour, marked with long radial, dark purple-brown spots, variously disposed in patterns, or scattered, or coalescing into a large area over the ventral part of the posterior half of the shell.

So within, some are quite white: others have a dark-brown line along the pallial margin, and edging each adductor scar: others have the muscle-scars and the greater part of the interior of a dark purple-brown.

The extent to which the muscle-scars, anterior or posterior, are supported by a callosity also differs greatly.

There is every combination of the above-named differences, so that no true varieties can be established; only individual variations are recognized.

### Glycimeris sordidus, Tate.

F 43

*Pectunculus sordidus*, Tate, Trans. Roy. Soc. S. Austr., 1891, vol. xiv., p. 264, pl. xi., f. 8. Type locality, St. Vincent Gulf, 9 to 11 fathoms, alive (Verco). I have taken it since in numbers in Hardwicke Bay, in Backstairs Passage, and in Investigator Strait, at all depths from 13 to 22 fathoms.

Professor Tate had only an immature individual from

which to describe his new species, and the figure given is a rather faulty representation of his type. Material obtained since furnishes the following information, and establishes it as a true species.

The dimensions given are:—Antero-posterior, 20 mm.; umbo-ventral, 18; sectional diameter, 10·5. My largest example measures 36 by 37 by 19·5. As it grows it therefore tends to become comparatively shorter antero-posteriorly, and more obese in section. Two individuals, each 32·5 and 33 mm. in the above measurements, have respectively sectional diameters of 20 and 16 mm., demonstrating very great difference in ventricosity.

There is a marked tendency to rest-periods in its growth, producing, at intervals of about 5 millimetres, concentric steps from a half to one millimetre in depth. There are usually four of these in the adult; there may be six. Then they rapidly become closer and less valid, until the senile stage is reached, when the shell increases much in obesity and very little in altitude, and they are reduced to close-set concentric striae.

The species is appropriately designated "sordidus," for most shells show scarcely any colour markings on their dirty-white surface. But some are irregularly sparsely dotted with reddish-brown, in somewhat zigzag concentric lines, and are ornamented with four broad, curved, dark purple-brown flames crossing the anterior and posterior marginal areas of the shell.

#### *EXIMIO* *Thracia myodoroides*, E. A. Smith. F 130

*Thracia myodoroides*, E. A. Smith, Chall. Zool., 1885, vol. xiii., p. 70, pl. vi., f. 6-6b. Type locality, off East Monceur Island, Bass Strait, in 38 to 40 fathoms: Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xvi (n.s.), part i., p. 104.

This shell was recorded for South Australia by Professor Tate under the name of *Thracia modesta*, Angas, from Tapley Shoal, in Trans. Roy. Soc. S. Austr., 1888, vol. xii., p. 67.

It has been dredged alive at all depths between 8 and 22 fathoms; most abundant at 20 to 22 fathoms. Valves are found at all depths up to 60 fathoms; most numerous between 15 and 22 fathoms. It is fairly abundant, and is distributed from Beachport westward through Spencer and St. Vincent Gulfs.

As the shell grows larger, it changes in shape, becoming proportionally longer antero-posteriorly; thus the type is 13 mm. long by 9·5 mm. high. Other individuals are 16 by 10 and 18 by 11, whereas they should be 11·6 and 13·1 in height respectively.

*EXIMIO***Thracia concentrica**, n. sp. Pl. xxviii., figs. 12, 13, 14. F132

Shell, rhomboid-oval; anterior-dorsal border straight, scarcely convex; posterior-dorsal border rather more concave; ventral-border uniformly slightly convex, joining the anterior border with a sharp curve; posterior end nearly vertically truncate, scarcely rounded at the superior angle, more at the inferior. A rounded umbonal ridge curves to the posterior inferior angle. Numerous valid, round, rude, incomplete, ill-curved concentric ribs frequently overlap in the median area. Fine crowded, crooked, radial incisions cross the ribs and spaces, and interrupt more crowded concentric incisions, so as to produce a microscopic shagreen pattern. There is a depressed lanceolate dorsal area behind the umbo, at the margin of which the ribs cease, and which is finely antero-posteriorly striate. In the right valve is a very narrow furrow within the dorsal borders for the edge of the left valve, and its inner margin behind the umbo projects as a laminar tooth, soon vanishing posteriorly. The inner surface is glistening, and has faint radial substriations. The pallial sinus is of moderate depth and round.

*Dimensions*.—Umbo-ventral, 10·8 mm.; antero-posterior, 14·1; sectional, 4·9.

It has not been dredged alive or with united valves, and one cannot be certain about its left valve.

It closely resembles *T. myodorooides*, of Smith, but is more ventricose, has a concave post-dorsal border, and is much more validly concentrically ribbed.

*Habitat*.—23 fathoms, Backstairs Passage.

*EXIMIO***Thracia lincolnensis**, n. sp. Pl. xxviii., figs. 19, 20, 21. F131

Shell, thin, white, elongate-oval; anterior-dorsal border nearly straight, scarcely convex; posterior concave; ventral border almost straight in the posterior half, arcuately ascending in the anterior. Anterior end attenuately rounded, posterior end vertically, straightly truncate; superior and inferior posterior angles rounded. Right valve slightly more convex than the left, which is included all round except at the posterior end. Quite obsolete, flat, irregular concentric ribs, with very faint microscopic concentric striae. The right valve has a groove inside its dorsal margin, except at the umbo, to receive the left valve, and the inner edge of the groove projects to form lamellar teeth, most marked just in front of and behind the subumbonal notch. The pallial sinus is wide and round, and reaches nearly to the centre of the shell. The umbos are acute, incurved, and apposed.

*Dimensions*.—Antero-posterior, 7·3 mm.; umbo-ventral, 5·1 mm.; sectional, 3 mm.

It somewhat resembles *T. myodoroides*, E. A. Smith, but is smaller, though its proportions are the same. It differs in having a concave instead of a straight post-dorsal line, in not being excavate in front of the umbo, and in having a deeper pallial sinus.

It differs from *T. modesta*, Angas, in being longer posteriorly, and so more equilateral, and in a vertical truncation instead of one sloping upwards and backwards.

*Habitat*.—Dredged alive at 9, 20, 22, and 24 fathoms, at Port Lincoln, at Yankalilla Bay, and in Backstairs Passage.

**Pholadomya arenosa**, Hedley. *Family likely F 124*

*Thraziopsis arenosa*, Hedley, Proc. Linn. Soc. N.S. Wales, 1904, vol. xxix., part i., p. 197, pl. ix., figs. 26-27. Type locality, 100 fathoms, east of Wollongong, N.S. Wales, one valve.

*Pholadomya arenosa*, Hedley, *op. cit.*, 1906, vol. xxxi., p. 464, Masthead Island, Queensland.

Mr. Hedley has kindly identified my specimens by comparison with his type. Its dimensions were only 4·55 mm. by 2·9 mm.; a valve taken in 20 fathoms in Backstairs Passage measures 12 mm. by 7 mm. The typical shape and ornament are retained when adult.

Dredged alive in 5 fathoms, St. Vincent Gulf; dead in Spencer Gulf, Backstairs Passage, and in 62 fathoms northwest of Cape Borda.

EXPLANATION OF PLATES.

PLATE XXVII.

- Fig. 1. *Limopsis vixornata*, Verco.
- .. 2. *Limopsis eucosmos*, Verco.
- .. 3. *Nucula beachportensis*, Verco.
- .. 4. 4a, 4b. *Nuculina (Cyrilla) concentrica*, Verco.
- .. 5. *Limopsis tenisoni*, Ten. Woods, var. *penitervis*, Verco.
- .. 6. 6a, 6b, 6c, 6d. *Sepia braggi*, Verco.
- .. 7. *Lissarca rhomboidalis*, Verco.

PLATE XXVIII.

- Fig. 1, 2, 3. *Trigonia margaritacea*, Lamarck, var. *bednalli*, Verco.
- .. 4. *Glycimeris pectinoides*, Deshayes; senile state.
- .. 5, 6, 7, 8, 9. *Philobrya cuboides*, Verco, showing exterior, interior, dorsal view, and umbonal scale.
- .. 12, 13, 14. *Thracia concentrica*, Verco, showing minute sculpture, side view, and dorsal view.
- .. 15. Hair from *Modiola australis*, Lamarck.
- .. 16. Hair from *Modiola penetecta*, Verco.
- .. 17, 18. *Modiola penetecta*, Verco.
- .. 19, 20, 21. *Thracia lincolnensis*, Verco, side view, dorsal view, and imaginary umbo-ventral section.

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART VII.

By Jos. C VERCO, M.D., Lond., F.R.C.S., Eng., Etc.

PLATE XXIX.

[Read September 3, 1907.]

*Elaeochorbeis*

*Cyclostrema homalon*, n. sp. Pl. xxix., figs. 3, 4. 168

Shell small, thin, flatly depressed, of  $4\frac{1}{2}$  whorls. Apical whorls convex smooth. Spire whorls flat excavately sloping towards the upper suture, rounded towards the lower, with a spiral near the upper suture, which is well adpressed so as to simulate another spiral, and two near the lower suture. Body whorl large, with about seven spirals, the lowest forming a basal carina, starting where the inner lip joins the body whorl at its base, and ending at the outer third of the basal lip. Umbilicus large and perspective, with about ten spiral liræ. There is a smooth area between the outermost and the basal carina. The aperture is quadrate, with rounded angles, and lies in an oblique vertical plane. The labrum is excavated at a little distance from the suture, then projects curvedly forwards, and then continuously retrocedes. The inner lip is applied to the base, so that the aperture is not quite circular or complete. Very fine crowded axial microscopic markings, which do not follow the sinuosities of the outer lip.

*Dim.*—Largest diameter, 2·7 mm.; smallest, 2 mm.; height, 1 mm.

*Diagnosis.*—*C. harriettae*, Petterd, is closely allied, but has a less open umbilicus, and its labrum is not sinuous on the dorsum, but has a continuous convex curve; and the intra-umbilical spirals are much finer and more crowded.

*Variations.*—One variety attains a size of 4·1 mm. in diameter, and is more solid. Its aperture is rounder; the umbilicus wider and more perspective, is radially wrinkled, and may not have so many spiral liræ. There may be no spiral lira near the suture on the whorls, nor any elsewhere, or there may be several on the sides of the body-whorl. Some show the basal carina distinctly, others feebly, and others not at all; but the sinuosity of the lip is present and the microscopic radial markings.

*Locality.*—Type, 62 fathoms north-west of Cape Borda; var., 130 fathoms, Cape Jaffa.

*Cyclostrema pachyston*, n. sp. Pl. xxix., fig. 10.

165

Shell orbicular, depressed, of five whorls, spire slightly elevated. First two and a half whorls convex, smooth, followed by a spire-whorl, with five equidistant spiral liræ. Body-whorl upper surface flatly sloping, nearly smooth, with fine curved axial wrinkles antecurrent just below the suture, then obliquely retrocedent. Side convex, with four well-marked spiral liræ to the periphery. Base rounded with about eight spiral cords, very flat and low, separated only by incisions. Umbilicus minute, nearly filled up by flat callus expansions of the inner lip, producing rude curved radial wrinkles. Aperture round; outer lip oblique, thin and simple, somewhat crenulated outside by the liræ; basal part thicker and smooth; inner lip thin where applied to the base of the body-whorl, and expanding beyond the concave columella as a thick shiny smooth callus to the centre of the perforation.

*Dim.*—Greatest diameter, 2·15 mm.; smallest, 2 mm.; height, 1·5 mm.

*Locality*.—62 fathoms, north-west of Cape Borda, 10 dead.

The largest example is 3·2 mm. in diameter. In the larger shells the perforation becomes more open, and its sides are radially wrinkled.

*Pirookula**Cyclostrema denselaminatum*, n. sp. Pl. xxix., fig. 9. 159

Shell opaque-white, minute, turbinate, of four whorls, nearly detached, rapidly increasing. Protoconch one and three-quarter whorls, flatly convex, smooth. Spire-whorls convex. Sutures deep. Aperture circular, complete, detached from the base of the body-whorl; border simple. Umbilicus moderate, perspective. Sculpture begins abruptly from the protoconch; valid axial laminæ, about as high as wide, and one-half or one-third as wide as the interspaces, crowded, nearly 50 in the body-whorl, completely encircling the whorls and so visible in the umbilicus. Fine hair-like spiral threads, about 40 in the body-whorl, less crowded on the base and near the suture than on the periphery.

*Dim.*—Greatest diameter, 1·55 mm.; smallest, 1·4 mm.; height, 1·1 mm.

*Diagnosis*.—*Scala nepeanensis*, Gatliff, is more elate and has fewer axial laminæ. *Cyclostrema angeli*, Ten. Woods, is more elate and has a smaller perforation. *C. johnstoni*, Beddome, is similar in shape and has crowded axials, but has no spirals.

*Locality*.—Type from 62 fathoms, north-west of Cape Borda; Backstairs Passage, 22 fathoms, 6 dead.

**Gibbula reedi, n. sp.** — Pl. xxix., fig. 5. **112**

Shell solid, depressed conoid. Whorls, 4 smooth, flatly convex, slightly hollowed just below the suture. Summit blunt. Suture impressed. Periphery round, barely angulate. Base convex. Umbilicus moderate. Aperture oblique, roundly elliptical; outer lip simple, bevelled inside; a short thin glaze on the base of the whorl; columella arcuate, everted posteriorly, with a tiny notch where it joins the round basal lip at the end of the bordering lira of the umbilicus; throat smooth and iridescent. Sculpture: the dorsum looks as though it were spirally lirate, but is really quite smooth except for very fine microscopic curved retrocurrent accremental scratchings. On the base are about a dozen fine spiral incisions, with radial scratch-marks more valid and distant than on the dorsum; these are still stouter and wrinkling within and near the perforation. An inconspicuous lira borders the umbilicus, which has a shallow groove just above it. Colour, chestnut-brown, with dark-brown spiral hair-lines of varying width; dotted with tiny white spots, which, below the suture, are aggregated into small pyramidal blotches with their apex upward, six in the body-whorl. A white band, scalloped on both edges of these aggregated dots, encircles the periphery. An articulated white-and-brown spiral ornaments the lira bordering the umbilicus, a second lies just outside this, and another with more distant double white spots beyond; the rest of the base, which is of a lighter tint than the dorsum, has scattered tiny white dots. The umbilicus is white. Over all is a transparent glaze, with a bronze reflex.

*Dim.*—Greatest diameter, 6·2 mm.; smallest, 5 mm.; height, 3 mm. The species may reach 7·2 mm.

*Locality.*—The beach, Holdfast Bay (Tate); Leven's Beach, Yorke Peninsula (Zietz). It seems to be quite littoral. I have not dredged it.

There may be a faint gutter where the labrum joins the body-whorl. The colour may be dark-brown. The peripheral white band may fade out toward the aperture. The white blotches beneath the suture and the articulated bands around the perforation seem the most constant ornament.

It was formerly called in South Australia *Gibbula Fes-serula*, Ten. Woods, and was so catalogued as No. 348 in Adcock's Handlist of the Aquatic Moll. of South Australia, 1893, but his species has been recognized as an immature *Diloma Adelaidæ*, Philippi.

It has been named after Mr. Walter Reed, a South Australian collector, who took it on our shores.

*Nanicava**Adcorbis kimberi*, n. sp. Pl. xxix., figs. 1, 2.

287

Shell minute, translucent, oval. Whorls  $2\frac{1}{2}$ . Spire very low. Apex blunt; protoconch half a whorl, its apex buried, smooth, rounded, marked off from the spire-whorl by a scar. Suture impressed, slightly excavate. Periphery sharply carinate. Base very flatly rounded, and pressed flat at the carina. Umbilicus very wide and not defined. Aperature roundly oval, nearly on the basal plane; outer lip uniformly round, simple, thin, pinched into a minute gutter close to the suture; inner lip is a thin glaze over the body-whorl. Columella slightly arcuate, its edge posteriorly expanded and reflected over the umbilicus. Sculpture: crowded fine microscopic curved accremental lines; on the base more valid and fewer, and as radiating curved wrinkles, which faintly crinkle the carina.

*Dim.*—Greatest diameter, 3.7 mm.; smallest, 2.9 mm.; height, 1.2 mm.

*Locality.*—Aldinga (Kimber). Dredged in St. Vincent Gulf in about 20 fathoms (Verco).

*Diagnosis.*—It is allied to *A. angasi*, Adams, but has not the distant tubercles on the carina.

It is named after the collector who found it.

*Turritella Tornatula runcinata*, Watson. Pl. xxix., fig. 14. 296

*Turritella runcinata*, Watson, Proc. Linn. Soc., Lond., 1881, vol. xv., p. 218; Chall. Zool., 1886, Gasteropoda, vol. xv., p. 475, pl. xxx., fig. 3.

An individual of 38 mm. in length was dredged alive.

The radula is exceedingly small compared with the size of the shell. It has a somewhat quadrate rachidian tooth, finely denticulated, along the edge of its upper border, bent forward at a sharp angle. The single lateral is transversely rhomboidal, about twice as large as the central, and is also finely denticulate along the free edge of its bent-forward upper margin. The two marginals, elbowed about their middle, have a flange projecting from their upper border, and finely dentate. Miss J. Donald, in a paper on "Some Recent Gasteropoda, referred to the Family Turritellidae, and their Supposed Relationship to the Murchisoniidae," read January, 1900, and published in Pro. Mal. Soc., London, 1901, p. 47, etc., mentions *T. runcinata*, Watson, among other species of *Turritella*, and from their deep labral sinus suggests their affinity with *Murchisonia*. The Pleurotomariidae and Murchisoniidae are regarded as belonging to the Rhipidoglossa. But the radula of *T. runcinata*, Watson, plainly places it among the Tænioglossa, and allies it with the ordinary forms of *Turritella*, rather than with *Murchisonia*. If therefore *Murchi-*

*sonia* is to be associated with those *Turritellas* which Miss Donald has grouped under a new section, *Colpospira*, because of their deep sinus, this group must still be placed among the Turritellidae, and *Murchisonia* must be shifted with them into the same family, among the Taenioglossa, and separated from the Pleurotomariidae and other Rhinodoglossa. But the resemblances in the test of her *Colpospira*, and of *Murchisonia* are scarcely sufficient to justify this.

851

*Actaeon roseus*, Hedley, var. *areatus*, new var.

*Actaeon roseus*, n. sp., Hedley, Proc. Linn. Soc., New South Wales, 1905, p. 535, pl. xxxiii., f. 42. Type locality—Wyargine Point, Middle Harbour, Sydney; also Eden, New South Wales.

Our South Australian shell has a shorter spire and a longer aperture; also two white spiral bands and several undulating axial bands, which break the colour up into oblong blotches. Dredged in 18 fathoms, Investigator Strait; 22 fathoms, Yankalilla Bay; 15 fathoms, off Point Marsden, Kangaroo Island; and 25 fathoms, Thorny Passage, Spencer Gulf; all dead.

*Actaeon retusus*, n. sp. Pl. xxix., fig. 12. 850

Shell oval, shining, translucent, yellowish-white, thin, of six whorls. Protoconch of one whorl, apex immersed, convex, quite smooth, ending abruptly in an oblique retrocurrent scar. Spire whorls roundly shouldered immediately below the suture, then convexly sloping. Suture deeply narrowly channelled. Body-whorl roundly-obliquely cylindrical. Aperture obliquely-arcuately pyriform. Outer lip simple, smooth inside, finely-crinkled outside, very slightly compressed above its centre; basal lip well-rounded, its inner half distinctly everted. Columella with a wide, simple oblique fold just below the base of the body-whorl, over which the thin inner lip is applied to join the labrum at the suture. Umbilicus small.

Spiral incisions, six in the penultimate, forty in the body-whorl, extending to the columella, where they become crowded and fine. Very delicate, close-set, axial striae cross the incisions, which they punctate, climb, and crenulate their sides, and traverse the intervening flat spiral bands.

Dim.—Length, 9·4 mm.; breadth, 6·1 mm. Length of aperture, 6·5 mm.; width, 2·9 mm.

Locality.—Type, 200 fathoms, off Beachport, with two other examples; also in 100, 110, and 150 fathoms; off Cape Jaffa in 90 and 130 fathoms; N.W. of Cape Borda in 60 fathoms. In good condition, but none alive.

Diagnosis.—It differs from *A. roseus*, Hedley, var. *areatus*, Verco, in having a much less acute apex, a more elevated spire, narrower incisions, more crowded axial striae, a less pro-

nounced columellar fold, and the absence of the colour-pattern.

*Variations.*—One shell is somewhat more ventricose, another more elate, with more valid axial striae; the former has two faint rusty blotches of colour on the dorsum of the body-whorl, a little below the suture; the latter has the trace of a pinkish tinge.

**Pupa intermedia**, Angas.

852

*Buccinulus intermedius*, Angas, Proc. Zool. Soc., London, 1878, p. 862, pl. liv., f. 11. Type locality, Aldinga.

Adecock, Handlist of Aquatic Moll. of S. Austr., 1893, p. 10, No. 424.

*Solidula intermedia*, Angas, Pilsbry., Man. Conch, vol. xv., 1893, p. 145, pl. XXA, figs. 55, 56.

It has been dredged dead in Hardwicke Bay, Spencer Gulf, Investigator Strait, St. Vincent Gulf, and Backstairs Passage, at all depths from 14 to 22 fathoms, and at 62 fathoms N.W. of Cape Borda. It has been taken alive at 15 fathoms, Investigator Strait.

It exhibits the following variations:—The middle third of the body-whorl may be slightly concavely compressed. The axial sculpture may vary from microscopic accremental striae, just punctating the spiral incisions, when these are narrow, or crenulating their edges when wider, up to fairly well-marked oblique striae, which divide the wide incisions into squarely-rounded shallow pits, and cross the intervening flat riblets. The spiral incisions may be equidistant all over the body-whorl, or absent from the upper half of the body-whorl, or they may be trebly distant here. They may be merely very fine and shallow punctate engravings, or rather wide furrows with crenulated edges, or latticed into squarish pits. But all variations grade into one another.

**Pupa hyalina**, n. sp. Pl. xxix., fig. 11.

853

Shell minute, diaphanous, fusiformly oval, five whorls. Protoconch distinct, glassy, smooth. Suture adpressed. Whorls sloping, convex. Aperture narrow, long, and pyriform. Outer lip uniformly curved, simple, thin, continued into a round basal lip, which is thickened towards the columella. The inner lip is a thin glaze over the body-whorl, and is expanded slightly beyond the pillar over the perforation. There is a curve of the columella forming a plait running into the basal lip, and a second well-marked oblique plait where the pillar joins the body-whorl. The spire-whorls have sub-lenticular wavy spiral incisions, which also cover the body-whorl, being most marked at the base, and nearly as well marked below the suture. Very fine, rather sinuous, accremental striae. Colourless.

*Dim.*—Length, 3 mm.; diameter, 1.5 mm.; length of aperture, 2.2 mm.

*Locality.*—Fowler and Streaky Bays (Tate).

**Myodora tasmanica**, Tenison Woods.

*Myodora Tasmanica*, n. sp., Ten. Woods, Proc. Roy. Soc., Tasm., 1875 (1876), p. 160. Type locality—Long Bay, Tasmania. Tate and May, Proc. Linn. Soc. N.S.W., 1901, vol. xxvi., part 3, p. 422, pl. xxvii., figs. 104-106.

Dredged off Beachport in 100 fathoms, 5 valves; in 110 fathoms, 50; in 150 fathoms, 2; and in 200 fathoms, 2 valves. It was not taken in shallower waters off the same place, and has not been taken on the South Australian beaches. It appears not to have been recorded from Victoria nor from New South Wales.

**Crassatellites kingicola**, Lamarck.

This shell was referred to by me in these Transactions, Vol. xxix., 1905, p. 169, as *C. pondrosus*, Gmelin. It appears now that our *C. castanea*, Reeve, should be regarded as a variety of *C. kingicola*, Lamarck.

It has been dredged in a subfossil state in soft limestone in the Port Adelaide Channel. One valve was taken in 40 fathoms, and two in 100 fathoms off Beachport, both small and poor. Hitherto, therefore, its habitat has been very restricted as to depth, viz., from 15 to 20 fathoms.

*Sala putum*

**Crassatellites discus**, Hedley.

*Crassatellites discus*, Hedley, Records Austr. Mus., vi., 1907, p. 300, pl. lvi., figs. 26-27. Type locality, 80 fathoms, off Narrabeen, New South Wales.

None were dredged alive, but valves in good condition were obtained. Off Beachport, at 40 fathoms, 31 valves; at 49 fathoms, 22 valves; at 100 fathoms, 4 valves; at 110 fathoms, 20 valves; at 150 fathoms, 17 valves; and at 200 fathoms, 2 valves. Off Cape Borda, at 55 fathoms, 7 valves; and at 62 fathoms, 5 valves. Off Cape Jaffa, in 130 fathoms, 14 valves. This seems not to occur in the gulfs of South Australia, but to be an ocean form, and to affect the deeper waters.

**Crassatellites carnea**, Tate.

*Crassatella carnea*, Tate, Trans. Roy. Soc., S. Austr., vol. xiv., p. 263, pl. xi., f. 1, 1A. Type locality—Yankalilla Bay.

It has been dredged alive at all depths from 9 to 23 fathoms, most abundantly from 20 to 23 fathoms. Valves have been taken, small and in poor condition, off Beachport at 110 and 200 fathoms, and off Cape Jaffa, in 90 fathoms. Comparatively large valves were taken off Beachport in 40

fathoms, the largest being 25 mm. antero-posteriorly, and 20 mm. umbo-ventrally. Tate, in his original diagnosis, remarked: "This species is very like *C. aurora* and *C. Banksii*, Adams and Angas, inhabiting Bass Straits, with regard to colour, ornament, and crenated margin of valves. It is, however, of a different form, is as widely removed from *C. aurora* as that species is from *C. Banksii*; thus, *C. Banksii* is oblong-ovate, *C. aurora* transversely ovate, and *C. carnea* is more rotund. They may eventually prove to be variations in shape of an aggregate species."

The proportion of length to height in *C. aurora* is 24 to 17, or as 100 to 71. That of Tate's type is 22 to 19, or 100 to 86·8. That of my largest is 25 to 20, or 100 to 80. Therefore my largest shell approximates somewhat more to the type of *C. aurora* than does Tate's type of *C. carnea*, but is still much shorter; and as my larger shell is larger than Angas's type, and is nevertheless shorter, and is an old stout shell, the difference is not explained by the senility of Angas's shell. *C. carnea* may consequently be retained for the present as a distinct species.

*Talaborica*

**Crassatellites banksii**, Adams and Angas, ~~var.~~ *angustior*; F 16  
n. var.

*Crassatella banksii*, Adams and Angas, Proc. Zool. Soc., Lond., 1863, p. 427, pl. xxxvii., fig. 16. Type locality—Banks Straits. Conch. Cab. Kuster, 1886, bd. x., abt. i., p. 26, pl. vii., f. 14.

In 55 fathoms north-west of Cape Borda I dredged 16 small and 33 large valves of a species which corresponds with *C. Banksii* in its oblong-ovate shape and truncated posterior end and colouring. Its dimensions, however, do not correspond. It is narrower antero-posteriorly for the same height. *C. banksii* is 16 mm. long by 10 high; mine are 12 mm. long by 10·2 high—hence the name *angustior*. My largest specimen is 23 mm. by 20·5. To be in proportion it should be 32·8 mm. long instead of 23. I have preferred to call it a variety rather than create another species based on this one difference. It has not occurred elsewhere in my dredging.

*Salapuctatum* ~~var.~~  
**Crassatellites producta** Verco. F 168

*Crassatella producta*, n. sp., Trans. Roy. Soc., S. Austr., 1895, vol. xix., p. 92, pl. 1., f. 2.

Fifty valves were dredged off Cape Borda in 55 fathoms, in very good condition. Beyond this depth in the same neighbourhood at 60 and 62 fathoms; off the Neptunes, in 104 fathoms; and off Beachport, in 110 fathoms; from one to six valves in poor preservation were obtained, and none beyond. Its habitat is probably from 15 to 20 fathoms, up to 50.

*Salapuctium*  
*Crassatellites micra*, Verco.

*Crasatella micra*, Verco., Trans. Roy. Soc., S. Austr., 1895,  
vol. xix., p. 93, pl. 1, fig. 3.

F169

Previously dredged alive in 20 and 22 fathoms; one has since been taken alive in 16 fathoms, three miles off Tunk Head, and one perfect individual and 11 valves in 62 fathoms north-west of Cape Borda. Valves have been obtained off Beachport, 10 in 49 fathoms, and 12 in 110.

*Salapuctum*  
*Crassatellites probleema*, n. sp. Pl. xxix., figs. 6, 7.

F170

Shell transversely-orbicularly oval, solid, projecting anteriorly. Umbo prominent, incurved, prosogyre, acute. Post-dorsal side roundly sloping; anterior dorsal side concave near the umbo, then nearly straight, continuing into a well-rounded front side; ventral border with a uniform open curve, merging into the slope of the posterior side, with an inconspicuous round angulation. The surface is corrugated with about twenty solid wide concentric ribs, more projecting at their upper border, wider than their interspaces. For about 2·5 mm. from the apex the surface is smooth. Inner border simple and smooth. Colour light horn-tint.

*Dim.*—Antero-posterior diameter, 10·3 mm.; umbo-ventral, 9·4 mm.; sectional of the two valves, 4·25.

*Locality*.—Off Beachport, in 100 fathoms, 2 valves; 150 fathoms, 14 valves.

*Diagnosis*.—In shape it is very like *C. micra*, Verco; but this is a much smaller shell, with an equal number of concentric ribs, and these extend quite up to the apex. It closely approaches *C. discus*, Hedley, in the smooth area near the umbo, and in the marked concentric ribbing, but has the front much more produced, and the postero-lateral area not flat or truncated at the border.

*Variations*.—In some the angle at the umbo is more acute and in others less than in the type, so that the shell is proportionally narrower or wider. In some, especially the wider ones, there is a tendency to slight truncation in the posterior part of the ventral border.

*AustroLima genina*  
*multicostata*, Sowerby.

F91

*Lima multicostata*, Sowerby, Thes. Conch., 1847, vol. 1, p. 85, sp. 6, pl. xxii., f. 38. Type locality—"Mediterranean (?)", Reeve's Conch. Icon., 1872, vol. xviii., pl. 1, f. 4; E. A. Smith, Chall. Rep., Zool., vol. xiii., 1885, p. 288; Tate, Trans. Proc. Roy. Soc., S. Austr., 1886, vol. ix., p. 108; Tate and May, Proc. Linn. Soc., N. S. Wales, 1901, vol. xxvi., part 3, p. 440; Pritchard and Gatliff, Roy. Soc., Vict., 1904, vol. xvii., (N.S.), part 1, p. 259.

*Radula lima*, Linné, Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 91; Ten. Woods, Proc. Roy. Soc., Tasm., 1878, p. 56.

*Lima lima*, Linn., var. *multicostata*, Sowerby, Hedley, Mem. Austr. Mus., vol. iv., 1902, p. 309.

Dredged alive at all depths, from 9 to 30 fathoms; embedded in sponge or attached inside dead *Pinna inermis*, etc. Off Beachport and Cape Jaffa, valves only, at 49, 110, 130, and 200 fathoms. One specimen, at 110 fathoms, off Beachport, has 45 ribs; usually they have from 25 to 30.

**Lima bullata, Born.**

*Ostrea bullata*, Born., Mus. Caes. Vindobon., 1780, p. 110, pl. vi., f. 8; Dillwyn, Desc. Cat., 1817, p. 270.

*Lima bullata*, Born., Sowerby, Thes. Conch., 1843, vol. i., p. 84, pl. xx., f. 32, 33; Hanley, Cat. Rec. Bivalve. Shells, 1843, p. 266; Sowerby in Reeve's, Conch. Icon., 1872, vol. xviii., p. 1, f. 3 *a* and *b*; Tate, Trans. Roy. Soc., S. Austr., 1886, vol. ix., p. 109, No. 162; Adecock, Handlist Aquatic Moll., S. Austr., 1893, p. 14, No. 202; Hedley, Mem. Austr. Mus., vol. iv., part 5, 1902, p. 310.

*Radula (Limatula) bullata*, Born., Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 93.

*Lima (Limatula) bullata*, Born., Tryon, Struct. and Syst. Conch., 1884, vol. iii., p. 287, pl. 132, f. 93; E. A. Smith, Chall. Zool., 1885, vol. xiii., p. 292; Tate and May, Proc. Linn. Soc., N.S. Wales, 1901, vol. xxvi., part 3, p. 440; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xvii. (N.S.), part 1, p. 260.

*Lima stranguai*, Sowerby, in Reeve's Conch. Icon., 1872, vol. xviii., pl. 1, f. 3*a*, *b*.

Dredged alive at Port Lincoln in 9 fathoms, 1 very small; in Backstairs Passage in 18 fathoms, 1, and in 20 fathoms, 4, so that it is very rare in deep water. Valves have been taken off Beachport, Cape Jaffa, and off the Neptune Islands at 40, 60, 90, 100, 150, and 200 fathoms, generally in poor condition, especially the larger examples.

*Mantellum orientale* f. 94  
*Lima angulata*, Sowerby.

*Lima angulata*, Sowerby, Thes. Conch., 1843, vol. i., p. 86, pl. xxii., f. 39 and 4. Type locality.—Panama and Bay of Caraccas, 10 to 12 fathoms. Sowerby, in Reeve's Conch. Icon., 1872, vol. xviii., pl. iii., f. 13; Tate, Trans. Roy. Soc., S. Austr., 1886, vol. ix., p. 109; Adecock's Handlist, 1893, p. 14, No. 201; Hedley, Mem. Austr. Mus., 1902, vol. iv., p. 310.

*Radula (Mantellum) angulata*, Sowerby, sp. Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 92.

In Hardwicke Bay, Spencer Gulf, they occur in enormous numbers, from near shore to fifteen miles out, forming nests of small shells and fragments of shell in dead *Cardium* valves, etc., in about 15 fathoms. They have also been dredged at all depths from 9 to 24 fathoms, alive, throughout Spencer and St. Vincent Gulfs and Backstairs Passage. Off Beachport 4 well-preserved valves were taken in 110 fathoms, and 5 in 200 fathoms. It appears not to have been secured in Victoria or Tasmania, though taken off the coast of New South Wales in 50 and 75 fathoms, as valves.

*Limæa murrayi*, Smith.

*Lima murrayi*, Smith, Proc. Zool. Soc., Lond., 1891, p. 444, pl. XXXV., f. 26.

*Limæa murrayi*, Smith, Hedley, Records Austr. Mus., vol. vi., part 3, 1906, p. 223.

*L. acclinis*, Hedley, Records Austr. Mus., vol. vi., part 2, 1905, p. 46, f. 10. *Type locality*.—100 fathoms off Wollongong, also 300 fathoms east of Sydney Heads, N.S. Wales.

Dredged, separate valves, off Beachport, in 100, 110, 150, 200 fathoms; off Cape Jaffa in 130 and 300 fathoms; and in 104 fathoms, 35 miles south-west of Neptune Islands.

~~Gemmellina~~ *Limæa austrina*, Tate.

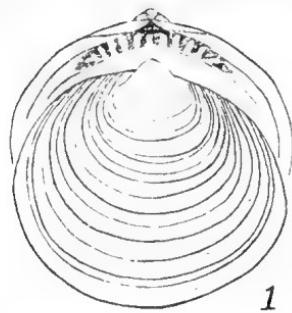
*Limæa austrina*, Tate, Trans. Proc. Roy Soc., S. Austr., vol. ix., 1886, p. 73, pl. iv., f. 7. F93

This is a common shell in deeper water. It has been dredged alive, at all depths, from 15 to 22 fathoms in Investigator Strait, Backstairs Passage, and off Newland Head; 1 in 8 fathoms, Eastern Cove, Kangaroo Island; and 1 in 49 fathoms, Beachport. It seems to be most abundant about 20 fathoms. Valves have been obtained in Spencer and St. Vincent Gulfs; as far east as Beachport, where it has been taken at 40 and 49 fathoms in numbers, and good; at 100, 150, and 200 few and poor; and as far west as Cape Borda and the Neptunes, in 45 and 55 fathoms.

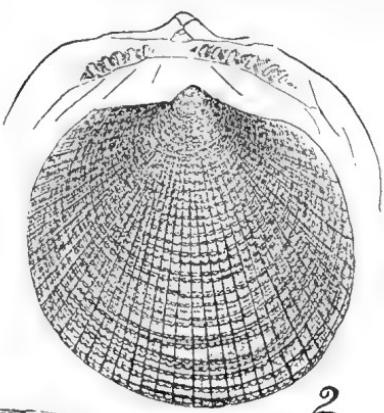
## EXPLANATION OF PLATE XXIX.

1. *Adeorbis kimberi*, Verco, ventral view.
2. " side view.
3. *Cyclostrema homalon*, Verco, dorsal view.
4. " side view.
5. *Gibbulà reedi*, Verco.
6. *Crassatellites probleema*, Verco, exterior.
7. " interior.
8. *Leptothyra carinata*, Verco.
9. *Cyclostrema denselaminatum*, Verco.
10. " *pachyston*, Verco.
11. *Pupa hyalina*, Verco.
12. *Acteon retusus*, Verco.
13. *Arcularia dipsacoides*, Hedley, radula.
14. *Torecula runcinata*, Watson, radula: A., rachidian; B., lateral; C.D., marginals.

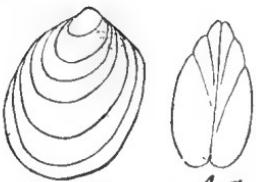
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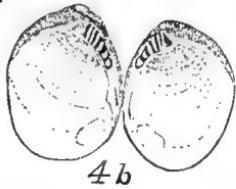


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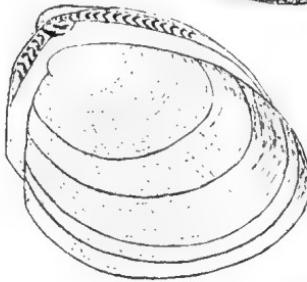


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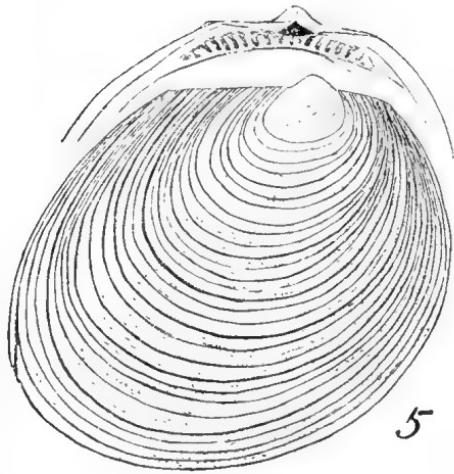
4a



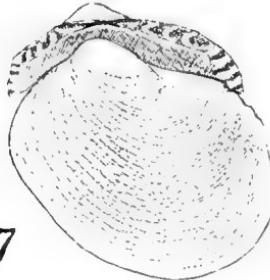
4b



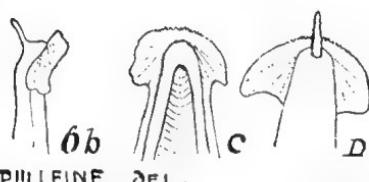
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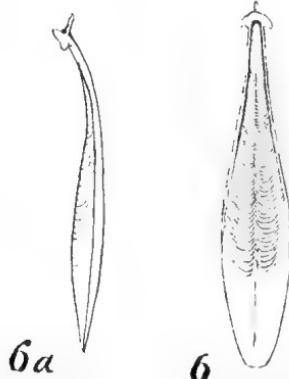


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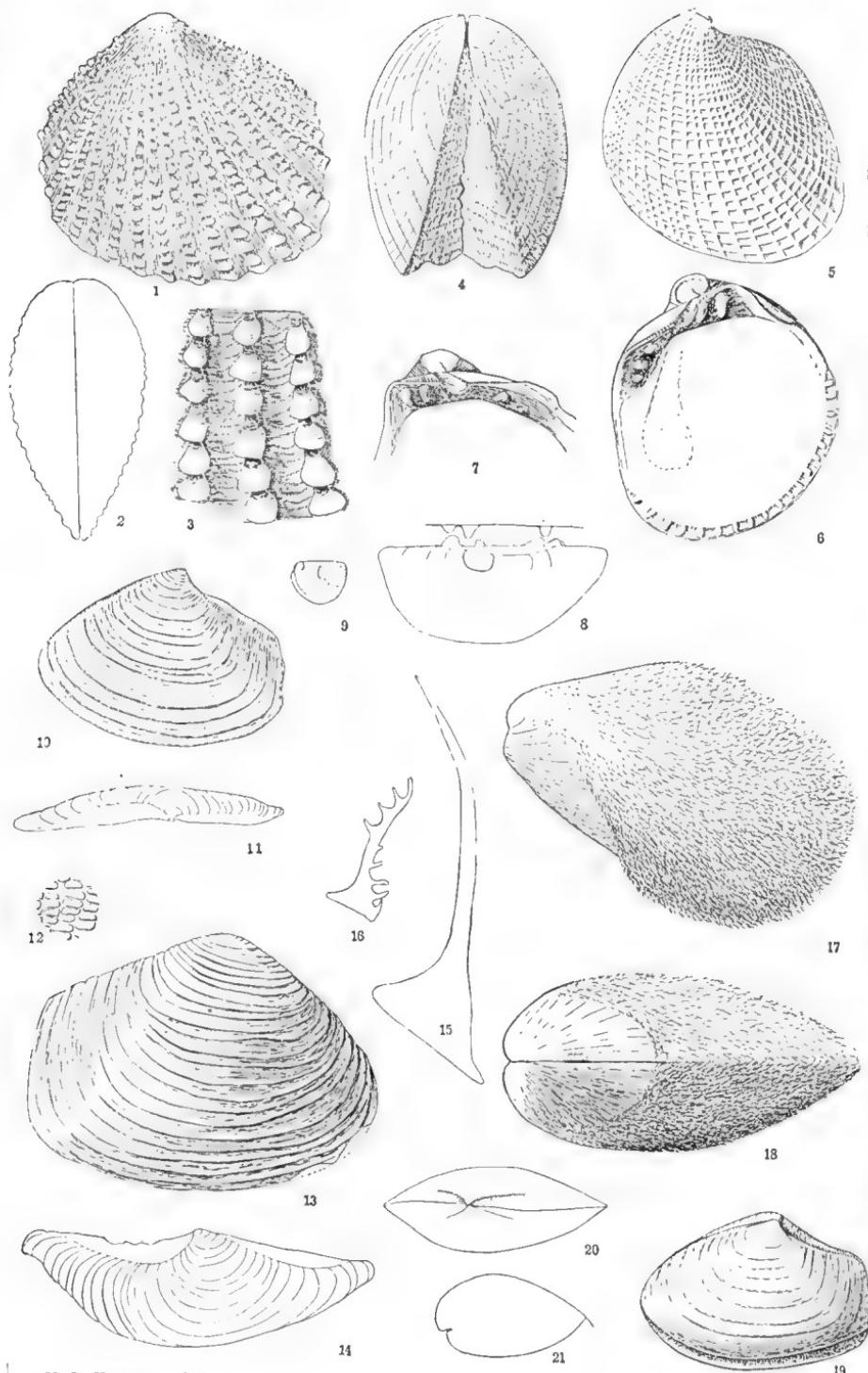


6a



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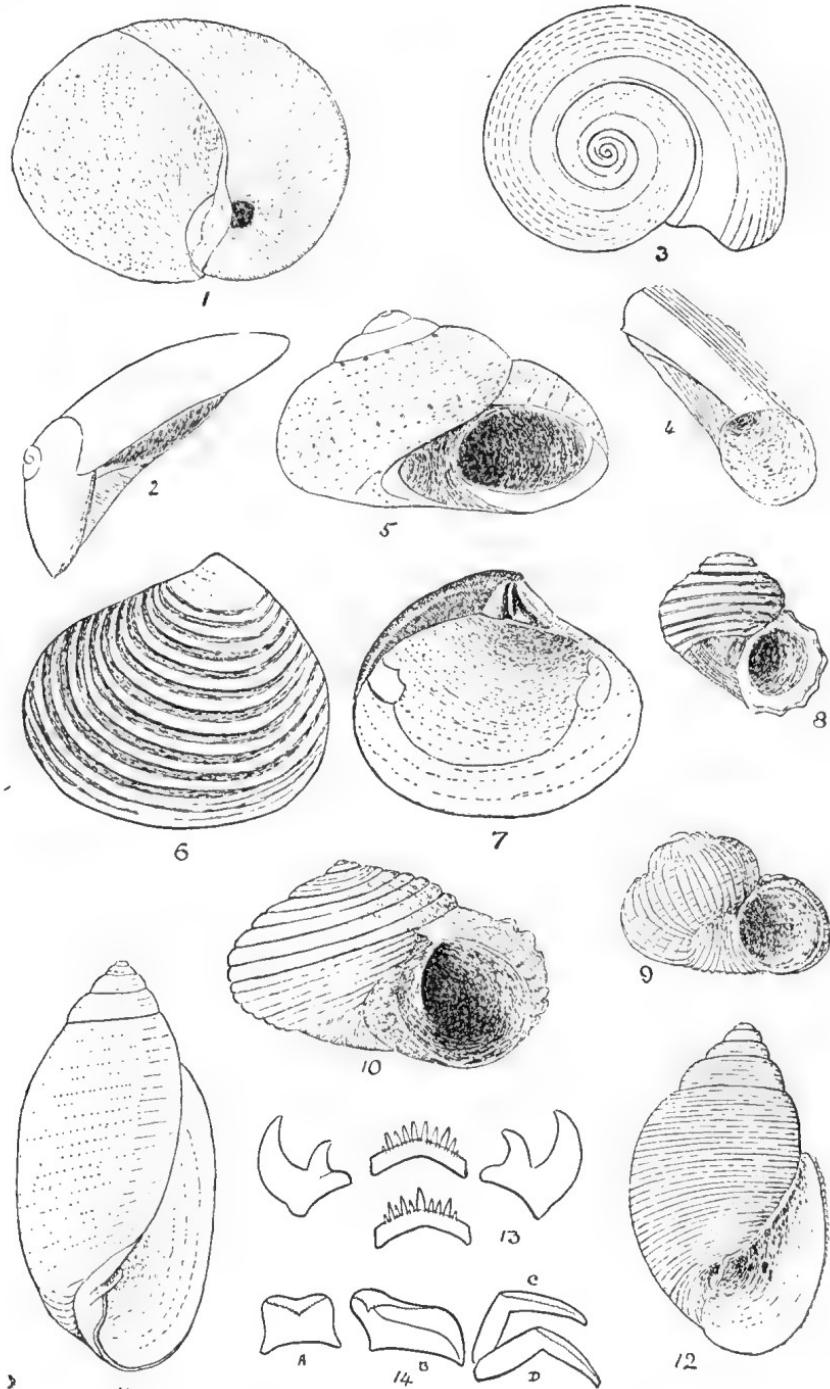




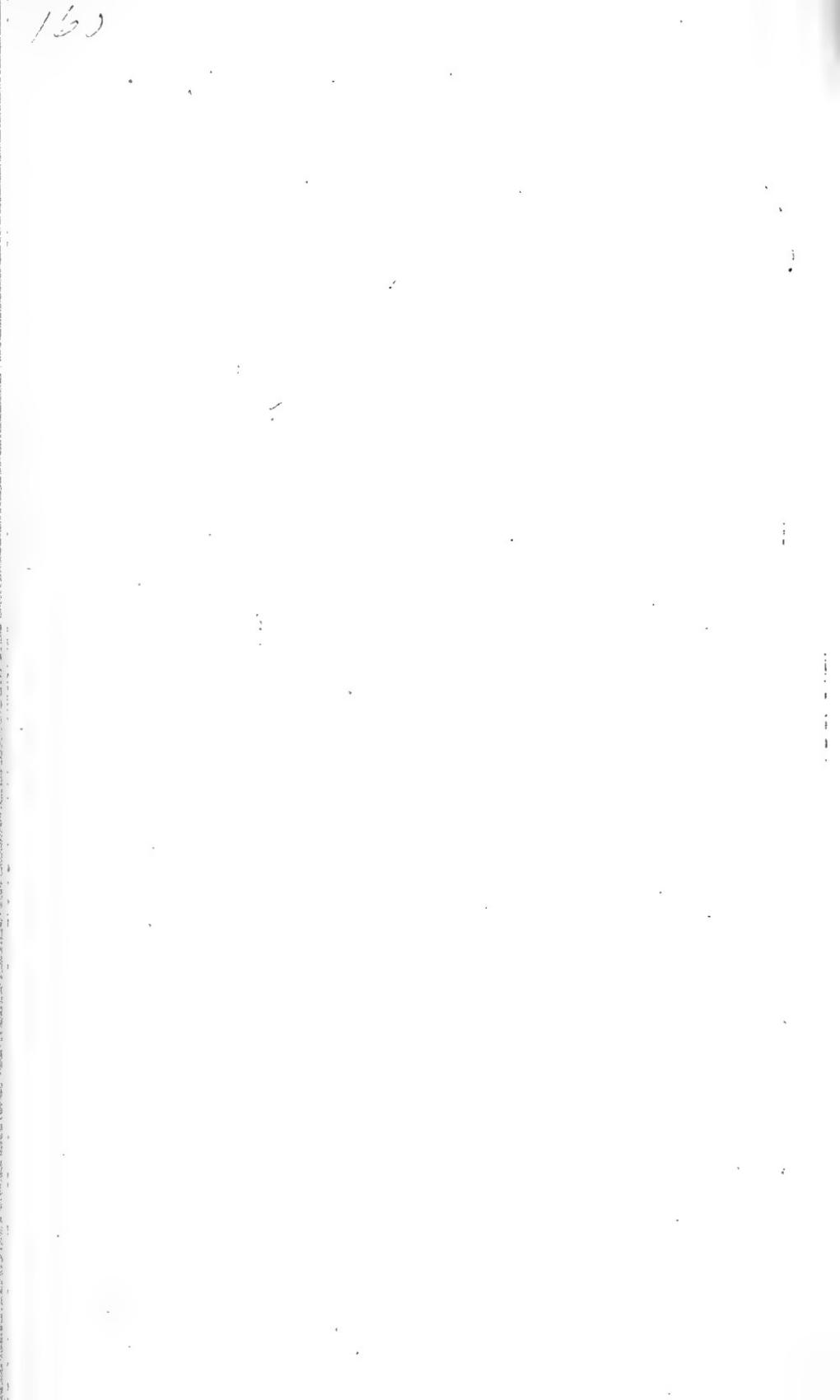
H. L. Kesteven, del.

Hussey & Gillingham, Printers, Adelaide.

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R.H.PULLEINE



NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART VIII.

By Jos. C. VERCO, M.D., F.R.C.S.

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxii., 1908.]

[Read June 2, 1908.]

PLATES XI. TO XIII.

**Emarginula subtilitexta**, n. sp. Pl. xi., figs. 6, 7, 8. *F8*

Shell ovate, rather thin, white. Apex well curved, one-sixth of the length from the posterior end. Convex anteriorly from apex to margin; posteriorly concave below the apex, then convex, then somewhat spreading near the margin. Slit narrow, margined by a low thin erect lamella. Posterior two-thirds closed; closing callus sunken, scalloped with transverse erect lamellæ convex towards the apex. Sculpture: 60 radial ribs, low and flatly rounded, about one-half as wide as the interspaces, projecting beyond and crenulating the margin. Concentric narrow erect lamellæ rather crowded cancellate the surface. Interior smooth and white.

*Dim.*—Length, 6·5 mm.; breadth, 4·9; fissure, 1·4 mm.; height, 2 mm.

*Locality.*—110 fathoms, off Beachport, 1 dead.

*Diagnosis.*—*E. superba*, Hedley, has the same number of radial ribs and the dentate margin, but has higher concentric lamellæ. *E. dilecta*, A. Adams, has a similar sunken scalloped slit fasciole, and nearly the same number of radials, rather more; but has ruder ribs wider than their interspaces.

**Puncturella (Cranopsis) corolla**, n. sp. Pl. xi., figs. 1 to 5. *33*

Shell thin, roundly oval, depressed conic. Apex eccentric, one-fifth of the length from the posterior end, spiral, well curved backwards. Protoconch projects on the right side and consists of two whorls, the first turn and a half are smooth, convex, glistening; the second half turn, which increases rapidly, is minutely crowdedly granular; at the junction of the two is a minute scar, the first part fitting into the second. In the adult shell the latter part of the protoconch looks directly backward. The sculpture of the shell begins gradually as incremental wrinkles, and next as radial riblets. Where the wrinkles commence the slit begins. The dorsum in front is a uniform convex curve, behind it is a continuous concave curve. The perforation occupies the middle third of the dorsal slope, and is lanceolate. Between it and the

protoconch its previous site is closed by a sunken lamina with subdistant erect transverse lamellæ, convex posteriorly. Between it and the anterior margin is a differentiated rib, broader and higher than the rest, fissured superficially throughout. In its upper part the fissure is as wide as the perforation, but is nearly closed internally by horizontal laminæ from the sides. It gradually contracts anteriorly to a fine line; in its upper half the fissure communicates with the interior, in the lower it is shut off. The slit fasciole and perforation are bounded on each side by a delicate erect lamina, highest at the perforation, in front of which the laminæ gradually approximate to form the differentiated rib. From the protoconch to the margin this lies a little to the right of the actual median line of the shell. Sculpture: Radial ribs, well rounded, nearly smooth, about as wide as their interspaces, sixteen primary, but increasing rapidly by intercalation of secondary and tertiary riblets to 90 in a shell of 10 mm. length, and crenulating the margin. These riblets appear first as gradually enlarging tubercles in the centre of the intercostal spaces, situated on the concentric laminæ, which conspicuously cross the interspaces, slightly scale the bases of the ribs, but are barely visible under the microscope on their summits. They produce radial lines of punctations in the interspaces, and in old dead specimens, where the glaze disappears from the interior, these appear as perforations. The ribs posteriorly are broader and closer together. Internally a small shelf or septum convex towards the interior, with a sharp simple margin anteriorly hides the upper fourth of the perforation, being attached to the shell at a distance from the margins of the perforation about equal to the width of the perforation; it gets gradually narrower and less obvious posteriorly. Its dorsal surface slopes up to the slit fasciole, the last one or two scales of which roof in the back of its cavity. From the perforation anteriorly runs a gutter to the margin; in older examples this becomes a thin central ridge. Shallow radial furrows correspond with the external ribs. As individuals get older, the shell grows more rapidly posteriorly, so that the apex gets less eccentric, and the back part becomes very flat and sloping.

*Dim.*—When half-grown, length, 10 mm.; width, 8 mm.; height, 1·4 mm.; apex, 1·8 mm. from the posterior end. When full-grown, length, 18 mm.; width, 15·4 mm.; height, 4·7 mm.; apex, 5·4 mm. from the posterior end.

*Locality*.—130 fathoms, off Cape Jaffa, 20 whole or broken; 300 fathoms, 4, all dead.

*Obs.*—The shell appears to fall within the limits of *Cranopsis*. I have no shells of this genus with which to com-

pare it, and the illustrations in Tryon's "Manual" are very small; but the perforation on the slope and the internal septum coincide with its definition. One can see in different individuals the varied aspects of the shell at successive stages, first a depressed spiral shell with a simple aperture; then an emarginula-like form, with a slit and slit fasciole; then a rimula-like shell, with a perforation just above the margin, continued as a narrow fissure to the border, and finally with the fissure closed and the perforation complete.

**Modiola projecta**, n. sp. Pl. xiii., figs. 12 and 13. *Bivalve* F104

Shell solid, narrowly oblong, inequilateral. Umbo directed forward at the junction of the first and second fourth of the shell, approximate, round, inflated. Anterior dorsal margin with a uniform rounded slope, commencing just behind, and within the apex of the umbo, over the front of which it is reflected. Posterior dorsal margin straight, very gently convex. Anterior end round; posterior end sloping convex. Post-dorsal angle a very obtuse curve, post-ventral angle a much smaller curve. Ventral border nearly straight, slightly concave, almost parallel with the dorsal borders. Margin simple, smooth. A groove increasing in width runs from the umbo backwards within the post-dorsal border for three-quarters of its length, formed by a stout, projecting internal lamina, which widens for half its length, and then gradually dwindles. The posterior muscle scar is rather deep. Of the two oblique umbo-ventral ridges the anterior is the more distinct. Externally there are obsolete accremental striae, and in the earlier stage distant, rounded, low, concentric ridges, more marked towards the front. Traces of a dark epidermis are present.

*Dim.*—Antero-posterior diam., 10·9 mm.; umbo-ventral, 4·1 mm.

*Locality*.—Off Beachport, 200 fathoms. One right valve.

**Modiolaria semiradiata**, n. sp. Pl. xiii., figs. 14 and 15. *Bivalve*

Shell oblong-ovate, ventricose. Umbo terminal, flattened, directed forward, applied to the front end of the shell. Post-dorsal border straight, short, thin, then faintly curved. Posterior end round; ventral border straight, anterior end round. Margin crenulated on the edge, with rounded teeth along the curved part of the post-dorsal border and at both ends. The ventral border shows no teeth, but probably because it is a little eroded. A narrow oblique furrow runs between the apex of the umbo and the adjacent front margin of the shell. An inflated ridge runs from the umbo to the posterior end, steep on the dorsal side, and gently sloping on the ventral.

Accremental striae irregular in distance and size mark the surface, and form rude flat concentric ridges at intervals. Well-marked radial striae cover all the posterior half of the shell, extending from the umbo to the ventral border, somewhat interrupted at the edges of the concentric ridges; these are quite absent from the anterior half.

*Dim.*—Antero-posterior diameter, 8·9 mm.; umbo-ventral, 5·2; sectional of one valve, 3·5 mm.

*Locality.*—Cape Jaffa, 130 fathoms, one valve.

*Excoecoperna*

*Arcoperma scapha*, n. sp. Pl. xii., figs. 1 to 5. *F112*

Shell small, solid, white, oval. Umbos terminal, round, inflated, directed slightly forward, approximate but not in contact. Prodissoconch very distinct, separated definitely from the dissoconch by a fine groove; its earliest third is quite smooth, its later two-thirds engraved with concentric lines, gradually growing more valid. Post-dorsal border nearly straight for 1·7 mm., forming an open rounded angle with the posterior border, which is nearly straight for 1·7 mm., then sweeps with a slight convexity into the short-curved, circular, ventral border. The anterior dorsal border is very short, almost entirely under the umbo. The antero-ventral border is slightly convex. The whole dorsum is engraved with crowded, slightly-curved, radial lines, latticed by concentric lines nearly as valid; some of the latter at distant intervals in the early stages of growth are much deeper, so as to form slightly imbricating ledges. The inner margin of the shell has fine denticulations from the end of the post-dorsal border all round and almost to the central extremity of the anterior dorsal border under the umbo; they do not reach the outer edge of the shell. The straight edge of the prodissoconch is set somewhat obliquely to the anterior dorsal border, the central extremity of which extends slightly behind the centre of the edge of the prodissoconch. The post-dorsal line is provided with many (more than 20) close-set, low, vertical teeth on its inner surface. Beneath them is the scar of the ligament for the anterior three-fourths of their extent, somewhat increasing in width posteriorly, and having a rounded end. It seems to pass out between the prodissoconch and the anterior dorsal hinge-line to become external. The anterior dorsal border has a few denticulations and one tooth, and is supported by a sort of thickening which projects slightly into the cavity of the shell and has a rounded central end. Two elongated muscle-scars occupy the middle third of the sides of the shell, not far from the margin, narrowing dorsally; the posterior is rather the larger.

*Dim.*—Antero-posterior diameter, 3·2 mm.; umbo-ventral, 4·5; sectional of closed valves, 3·6 mm.

*Locality*.—Off Beachport, 49, 100, 110, 150, 200 fathoms; off Cape Jaffa, 90 and 130 fathoms; off Cape Borda, 55 fathoms; east of Neptunes, 45 fathoms. Only one living specimen was taken in 45 fathoms. Valves were secured in numbers, chiefly between 45 and 110 fathoms; beyond this depth they were few. Mr. Hedley reports to me that it has been taken in 80 fathoms, 22 miles east of Narrabeen, New South Wales.

*Diagnosis*.—It somewhat resembles *Crenella globularis*, Tate, a tertiary fossil; but this is a wider shell comparatively, and more symmetrical.

The generic location of this shell has been somewhat difficult, and Mr. Hedley and Mr. Etheridge and Mr. Kesteven have compared it with allies in the Australian Museum, Sydney, and discussed its characters, and as a result it has been placed in *Arcoperna*, and becomes a second recent Australian species of this previously fossil genus, the first, *A. recens*, having been figured and described by Tate in *Journ. Mal. Soc., Lond.*, 1897, p. 181.

#### **Leptothyra carinata, n. sp.**

Figured in *Trans. Roy. Soc. of S. Austr.*, vol. xxxi., 1907; pl. xxix., fig. 8.

Shell minute, solid, three and a half whorls. The first two whorls are smooth, white and convex. The spire-whorl shows three rounded carinations, one just below the suture which is channelled by it, the second about one-third the distance between the sutures, and the third about one-fourth the distance from the lower suture. The interspaces are concave, and have spiral cords, equidistant; two in the upper space, the posterior the smaller; three in the middle space, small and equal. The body-whorl has seven carinations which become gradually lower towards the base, and closer; interspaces concave, and provided with spiral liræ, varying from six to two, according to the width of the spaces. The lowest carina forms a margin to the umbilicus which is wide and sculptured with about eight spiral liræ. The spirals are cut up at irregular intervals by radial incisions, and marked by very fine crowded microscopic radial scratches. The aperture is circular; its inner surface smooth, and its outer scalloped by the spirals. Colour, very light amber; some examples are white, others faintly tinged with pink.

*Dim.*—Largest diameter 1·4 mm., smallest 1 mm.; height 1·1 mm.; width of aperture, .7 mm.

*Locality.*—20 fathoms, outside Backstairs Passage, with six other examples, dead.

*Diagnosis.*—From *L. arenacea*, Pritchard and Gatliff; in its marked carinæ, more widely canaliculated suture, and wider umbilicus. From *Liotia alazon*, Hedley, in being a smaller shell, with less valid carinæ, and in its radial incisions.

***Cuspidaria dorsirecta*, n. sp. Pl. xi., figs. 9 and 10. F139**

Shell small, moderately solid, oval, equilateral. Umbo prominent, acute, prosogyre. Post-dorsal line straight; anterior concave in front of the apex, then straight; the front end uniformly widely curved, ventral border gently curved, with very slight incurving at the base of the rostrum, which is very short and wide. Well-marked granulated ridge from the umbo to the postero-inferior angle of the rostrum; a second ridge cuts off its upper fourth. In front of the former is a moderate depression. Surface smooth but for sublenticular accrescential striæ. It has one anterior and one posterior lateral tooth well developed, roundly-triangular; the latter slightly the larger, and from its end a very low but gradually rising lamina is continued nearly to the end of the rostrum, and forms a narrow, slightly-widening groove with the dorsal margin.

*Dim.*—Antero-posterior diameter, 5 mm.; umbo-ventral, 3·3 mm.

*Locality.*—Off Beachport, from 40, 100, and 110 fathoms; off Cape Borda, 60 fathoms; valves.

***Cuspidaria alta*, n. sp. Pl. xiii., figs. 8 to 11. F160**

Shell small, thin. Umbo tumid, blunt. Anterior dorsal border very faintly convex sloping; posterior dorsal border concavely sloping. Anterior end sharply rounded; posterior moderately and broadly rostrated. Ventral border uniformly widely arcuate, running concavely into the rostrum. An oblique, gradually-widening depression between the body and the rostrum, and an oblique ridge between its lower angle and the umbo; there is a second ridge close to the median line, the intervening space nearly flat. Outer surface smooth, but for sublenticular concentric striæ, which are much more marked on the rostrum. Right valve with an anterior and posterior triangular lateral tooth, the latter the larger, and its groove running some distance into the rostrum. Left valve edentulous, and lies within the margin of the right. The pallial line ends by a nearly vertical curved line from the umbo.

*Dim.*—Antero-posterior diameter, 6·8 mm.; umbo-ventral, 4 mm.

*Locality.*—Off Beachport, in 100 fathoms, 1 valve; 150 fathoms, 2 valves. Off Cape Jaffa, in 90 fathoms, 20 valves; in 130 fathoms, 1 valve. South-west of Neptunes, 104 fathoms, 3 alive and 26 valves.

**Cuspidaria angasi**, E. A. Smith.

*Neæra angasi*, n. sp., E. A. Smith, Chall. Zool., vol. xiii., 1885, p. 47, pl. ix., f. 2. *Type locality.*—Sta. 164n, off the coast of New South Wales, 410 fathoms, green mud.

Dredged in 130 fathoms, off Cape Jaffa, 2 alive, 1 dead, 3 valves.

The ventral border and the lower border of the rostrum of the right valve lie within the margin of the left valve, while its dorsal borders, anterior and posterior, extend beyond those of its fellow.

**Cuspidaria exarata**, n. sp. Pl. xii., figs. 6 and 7. F135

Shell ovately-pyriform, subequilateral, thin. Umbo round, inflated, directed backwards. Anterior dorsal margin slightly convex; front end with a round, uniform curve; ventral border gently arcuate, joining the rostrum with a short incursion. Post-dorsal slope nearly straight, barely incurved; rostrum short, slightly tapering. Fossette small, directed obliquely backwards. Right valve has no distinct tooth, but a low lamina runs from the fossette backwards for half the length of the posterior slope, to make a shallow, narrow furrow with its slightly more projecting border. The anterior dorsal slope is bevelled on its inner side, and has the trace of a furrow within it near the fossette. Interior glistening, smooth, white, with subdistant radial translucent lines ending at the simple pallial line. Externally about twenty triangular concentric ribs, with sharp lirate summits and sublenticular concentric striae on their sides; the ribs become less costate and more lamelliform towards the ventral margin, and at the depression in front of the rostrum, over which they are only irregular vertical striae. Colour dull opaque white, with faint axial less white striations.

*Dim.*—Antero-posterior diameter, 13·2 mm.; umbo-ventral, 7·5 mm.

*Locality.*—35 miles south-west of Neptune Islands, in 104 fathoms, one right valve perfect and the posterior half of a left valve, which if whole would be half as large again as the type.

*Diagnosis.*—It closely resembles *C. trailli*, Hutton, as figured by Mr. Hedley in Trans. N.Z. Institute, vol. 38, 1905, p. 72, pl. ii., figs. 9, 10, 11, dredged in 110 fathoms, east of the Great Barrier Island. It is also about the same size, minor

probably varying from 13 to 19 mm.; his example was 15 mm. Three differences appear. My species is more concave along the post-dorsal border, shows only bare traces of umbo-rostral liræ, and has no teeth in its right valve projecting beyond the vertical plane. Mr. Hedley tells me he has the same shell from 250 fathoms, off Sydney.

**Cuspidaria (Cardiomya) pinna, n. sp.** Pl. xiii., figs. 5 to 7. *F162*

Shell squarely oval, ventricose, rather thin, umbos inflated, rounded, approximate. Front dorsal border short, straight, scarcely convex, joining by a rounded slightly obtuse angle the straight barely incurved anterior end. This with a faint angulation joins the open-curved ventral border, which, after a definite incurvation, unites with the lower border of the rostrum. The post-dorsal border is feebly-concave to the end of the rostrum, which is rounded at its rather attenuated end.

The sculpture is very bold. Three distant valid round ribs curve from the umbo to the posterior third of the ventral border. In front of these are about seventeen subequal less prominent rounded ribs, equal in width to their inter-spaces. Behind them are two rather distant, less valid ribs, and three more extend from the umbo to the end of the rostrum. All these ribs furrow the inside of the shell, and all crenulate or scallop the ventral border in the ratio of their size and distance. The border of the rostrum is not scalloped. There are microscopic accremental striæ, most marked and erect towards the end of the rostrum. Immediately beneath the umbo is a small triangular cartilage pit, wider than high. In the right valve is a triangular laminar posterior lateral tooth, with a slight furrow forward to the pit and backwards nearly to the rostrum. Anteriorly, there is a long invalid lamina just within the border. The left valve has an anterior lamina, which forms, with its front dorsal margin, a shallow furrow to receive the lamina of the right valve. The post-dorsal margin of the left valve and its anterior lamina form a straight line, only interrupted by the notch of the cartilage pit.

The left valve lies inside the right valve throughout its post-dorsal border; the right valve lies inside the left, markedly along the posterior two-thirds of the ventral border, barely along its anterior third, and distinctly along the straight anterior end, where the right valve has a rather more concave edge than the left.

*Dim.*—Antero-posterior diam., 6·5 mm.; umbo-ventral, 4·1; section of united valves, 2·75.

*Hab.*—Off Cape Jaffa, in 300 fathoms, 3 alive and 12 valves; in 130 fathoms, 1 alive and 11 valves.

*Diagnosis.*—It is very closely allied to the *Cuspidaria perrostrata*, Dall, Bull. Mus. Comp. Zool., Harvard Coll., Cambridge, xii., 1885-1886, p. 296, pl. ii., figs. 3a, 3b, obtained in 339 fathoms, off Tortugas, and in 416 fathoms, gray ooze, near Grenada. Also in Bull., 37, United States National Mus., 1889, p. 66, pl. ii., figs. 3a, 3b. My species has a shorter rostrum, and the three bold ribs give it a distinct aspect. Dall says there is a good deal of variation in this group, and though my specimens vary scarcely at all, they may prove to be a variety of Dall's species. This shell contributes another new subgenus to the South Australian record, viz., *Cardiomya*.

***Cuspidaria (Halonympha) ros*, n. sp. Pl. xiii., figs. 1 to 4.**

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Shell small, inflated, pyriformly orbicular, very thin, diaphanous. Umbos visible, tumid directed somewhat backwards. Post-dorsal border a gentle incurved slope; anterior nearly continuous with the posterior for about two millimetres, then sweeping with an almost circular curve round the whole front and ventral border, to merge into the obliquely upward slope of the lower border of the rostrum, which is short, rather tapering, and round-ended.

Immediately beneath the minute approximate apex of each umbo is a projection carrying a tiny elongate cartilage pit. Some little distance behind this a wide-curved hollowed lamina, like half the bowl of a spoon, stands out in each valve.

There is a small elongate laminar cardinal tooth in front of the fossette of the right valve; none in the left.

The surface is smooth, but for microscopic concentric striæ, chiefly near the ventral margin.

*Dim.*—Antero-posterior diameter, 6 mm.; umbo-ventral, 4; sectional of closed valves, 2·5 mm.

*Locality.*—300 fathoms, off Cape Jaffa, 2 alive and 3 valves; 130 fathoms, 3 alive and 14 valves.

This new species introduces, for South Australia, a new subgenus, *Halonympha*, created by Dall and Smith, with *Neera claviculata*, Dall, as the type (Bull. of Mus. of Comp. Zool., Harvard Coll., Cambridge, vol. xii., 1885-1886, p. 301). It is characterized by an acute cardinal tooth in the right valve, none in the left; a small central fossette, and by a clavicular rib or myophore in the posterior part of each valve.

Our shell is very closely allied to *Neera claviculata*, Dall, Bull. Mus. Comp. Zool., 1881, vol. ix., p. 112, and *Halonympha claviculata*, Dall, Bull. Mus. Comp. Zool., Harvard

Coll., vol. xii., 1885-1886, p. 301, pl. ii., figs. 2 and 2a; also No. 425, p. 68, pl. ii., figs. 2 and 2a, in Bull. of the U.S. National Mus., xxxvii., 1889. *Type locality*.—North Atlantic, from 100 to 539 fathoms; also Chall. Zool., xiii., 1885, p. 52, pl. ix., figs. 8, 8b. *Locality*.—Bermudas, 425 fathoms, coral mud; here by the artist's mistake the clavicular process is omitted from the figure. But, judging from the illustrations and measurements given, our species differs in having a slightly longer rostrum, in being much smoother, and in its more spoon-shaped clavicle.

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### EXPLANATION OF PLATES.

#### PLATE XI.

- Fig. 1. *Puncturella (Cranopsis) corolla*, Verco, ventral view.  
 " 2. " " " " young specimen showing protoconch.  
 " 3. " " " " dorsal view.  
 " 4. " " " " sculpture.  
 " 5. " " " " profile.  
 " 6. *Emarginula subtilitexta*, Verco, profile.  
 " 7. " " " " dorsal view.  
 " 8. " " " " sculpture.  
 " 9. *Cuspidaria dorsirecta*, Verco, exterior.  
 " 10. " " " " interior.

#### PLATE XII.

- " 1. *Arcoperna scapha*, Verco, prodissococonch.  
 " 2. " " " " profile, joined valves.  
 " 3. " " " " interior.  
 " 4. " " " " exterior.  
 " 5. " " " " shell tilted up, so as to show the deep groove for the reception of the ligament.  
 " 6. *Cuspidaria exarata*, Verco, exterior.  
 " 7. " " " " interior.

#### PLATE XIII.

- " 1. *Cuspidaria ros*, Verco, exterior, lateral.  
 " 2. " " " " joined valves.  
 " 3. " " " " hinge.  
 " 4. " " " " hinge.  
 " 5. *Cuspidaria pinna*, Verco, exterior, lateral.  
 " 6. " " " " hinge.  
 " 7. " 8. *Cuspidaria alta*, Verco, exterior, lateral.  
 " 9. " " " " hinge.  
 " 10. " " " " "  
 " 11. " " " " "  
 " 12. *Modiola projecta*, Verco, interior, lateral.  
 " 13. " " " " exterior.  
 " 14. *Modiolaria semiradiata*, Verco, exterior, lateral.  
 " 15. " " " " interior.

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**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART IX.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxii., 1908.]

[Read October 6, 1908.]

PLATES XIV. TO XVIII.

**Turbo jourdani**, Kiener. Pl. xviii., f. 32, 33. 195

This very rare shell was named and described by Kiener in 1839 in the Rev. Zool. Soc. Cuvier, p. 324, and figured in the Mag. de Zool. de Guérin, 1840, Moll., pl. ix. To neither of these works have we access.

In 1843 Deshayes, in his edition of Lamarck's Anim. s. Vert., vol. ix., p. 224, says it belonged to the collection of Mons. Jourdan, after whom it was named.

In 1846 Philippi, in the Conch. Cab., ed. ii., Band ii., Abt. ii. and iii., p. 56, pl. xiii., f. 4, gives a description and figure, with the remark that he had never seen the species.

In 1848 Reeve, in Conch. Icon., Sp. 41, pl. xiii., writes: "Of this species there are two examples in the British Museum."

In 1873 Fischer, in Coq. Viv., Genus Turbo, p. 11, pl. xviii., gives a description and an excellent illustration of the smooth form.

In 1887 G. B. Sowerby, in the Thes. Conch., vol. v., p. 192, Sp. 8, pl. vi., f. 62, figures the form, which is validly spirally ribbed in the spire-whorls and obsoletely in the body-whorl.

The rarity of the shell is evident from the fact that all the above references but two are to the single shell belonging to M. Jourdan. Its habitat was the very indefinite one of "Australia" and "New Holland."

In 1888 Mr. M. M. Maughan found an immature example on the beach of Moonta Bay, in Spencer Gulf. It was identified by Prof. Tate, who held the opinion very strongly that it had been transported thither in ballast. Mr. Maughan saw no ballast about the beach, nor did he at any time gather any foreign shells there, although he did much collecting in the Bay. But no second specimen was ever taken.

In July, 1888, Mr. T. C. Watson, of Streaky Bay, South Australia, gave Mr. W. T. Bednall three specimens, the

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largest and best of which, containing the operculum, he presented to the South Australian Museum. It is nearly full-grown, but has had all the coloured external layer removed by erosion except near the aperture, where the mahogany tint and darker lines are still preserved.

On August 1, 1893, the late Prof. Tate, at a meeting of the Royal Society of South Australia, exhibited a specimen obtained in a subfossilized state from the silt of the Port Adelaide Creek at a depth of 24 ft. (Trans. Roy. Soc., S. Austr., vol. xvii., p. 354). This proved the existence at no very remote period of time of this species on the shores of South Australia, and located it in our extra-tropical southern coastline rather than in the tropical waters of Australia.

In 1905 Mr. A. Zietz kindly presented me with an immature bleached individual, which he had received from Fowler Bay.

In December, 1907, Dr. Torr and I searched the West Coast of this State at Port Elliston, Venus Bay, Smoky Bay, Streaky Bay, Scales Bay, Murat Bay, and Denial Bay, and LeHunte Bay, without finding a fragment of this species. But on St. Francis, the largest island in Nuyts Archipelago, we discovered its habitat, and gathered a score of examples in a state of greater or less dilapidation. Although Peron and Baudin called here and carried home many shells from this island and St. Peter's, they seem to have overlooked this Turbo. St. Francis lies some thirty-two miles from Murat Bay, and seventeen miles from the nearest point on the mainland. It has a number of reefs running out into the sea in a southerly, south-westerly, and westerly direction, with small sandy intervening bays. The southern swell is constantly breaking on these rocks and rolling as a surf into the tiny bays. The Turbos were found wedged between the piled-up boulders on the leeside of the reefs and in the crevices of rocks, and their opercula were cast up on the sandy beaches. It is really an ocean island, and is surrounded by water of thirty fathoms in depth.

We sought for living individuals, but unsuccessfully. Mr. Arnold, who has lived there for many years, found only one, just below watermark, on a rock face on the north of the island, some years ago. He says the animal is of a red colour.

On the top of the rocks were large quantities of opercula and fragments of *Turbo stamineus*, Martyn, which had been taken by gulls from the reefs at low water, and smashed so as to permit them to eat the shellfish; but we did not find a single fragment or operculum of *T. jourdani* among these remnants. Again, although immature *T. stamineus* were

common among the abundant rock-shells cast up on the shore, we collected only two tiny *T. jourdani*. We concluded, therefore, that this rare species lives at a greater depth than *T. stamineus*, hence the gulls cannot get them, and they are but seldom washed up. Dr. Torr explored the reefs in water up to his breast, secured by a safety-line to prevent him from being carried away by the undertow of the swell; but though *T. stamineus* was obtained in abundance, not a single example of *T. jourdani* was taken. This deeper habitat probably accounts for its rarity in collections.

Since writing the above Mrs. J. F. Irvine, of Ingle-side, Tasmania, tells me she has two fairly good specimens, sent to her some years ago by Captain Irvine. They came from Rottnest Island, off the western coast of Western Australia. Dr. Torr also informs me that an individual was taken alive by Mr. Kopp, when he was keeper of the lighthouse at Cape Borda, Kangaroo Island, at low tide, between Cape Borda and Snug Cove, on the shore of Investigator Strait.

The operculum was unknown to Kiener. It is of an oval shape, paucispiral, the largest having only five whorls, with the nucleus at a distance from the wider end of about one-fifth of the long diameter, proportionately much nearer the margin than in any other of our Turbos. The internal surface is slightly concave, with a low rounded cushion where the new spiral touches the old; beyond this is a shallow, rapidly-widening, slightly spiral depression, extending to the border. The external surface is smooth and polished. One margin, in an example 81 mm. in its long diameter, is 16 mm. in thickness, and the opposite is 5 mm., with a gradual slope between. A low spiral fulness runs obliquely across the outer face corresponding with the depression on the other side.

***Turbo gruneri*, Philippi. Pl. xviii., f. 36, 37.**

Philippi, in Zeit. fur Malak., 1846, p. 98, gives the type locality as "The Colony of Adelaide, New Holland." It occurs all along our South Australian coastline, as would be expected since it is found in Victoria, and in Western Australia as far round as Swan River (Sowerby). It has been dredged alive in 12, 13, 15, and 16 fathoms in Investigator Strait and in the open sea outside Backstairs Passage.

The operculum is elliptical and thick, paucispiral, with a chitinous layer on its inner surface. The outer surface is smooth, but shows some curved earlike processes, similar to but not nearly so valid as those found on the opercula of *T. stamineus*.

This character would place it between the *T. undulatus*, Martyn, which is smooth on the outside, and *T. stamineus*, which is markedly auriform and prickly. (Pl. xviii., f. 38, 39, and 34, 35.)

*Fossarina gibbula legrandi*, Petterd.

*Fossarina legrandi*, Petterd, Journ. of Conch., 1879, p. 104.  
*Gibbula legrandi*, Petterd, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 404, pl. xxiv., f. 21, 22; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1902, vol. xv., part 2, p. 133.

Beachport, shell sand (Verco).

*Gibbula galbina*, Hedley and May.

*Gibbula galbina*, Hedley and May, Records of the Austr. Mus., vol. vii., No. 2, 1908, p. 114, pl. xxii., f. 2. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Taken in 110 fathoms off Beachport, two examples dead, one specimen in 130 fathoms off Cape Jaffa.

*Fossarina Minos petterdi*, Crosse.

*Fossarina petterdi*, Crosse, Journ. de Conch., 1870, p. 303; 1871, p. 323, pl. xii., f. 1; Tryon, Man. Conch., 1887, vol. ix., p. 275, pl. lii., f. 20, 21; Pritchard and Gatliff, Roy. Soc., Vict., 1902, vol. xiv. (N.S.), part 2, p. 94.

*Minos petterdi*, Crosse; Hutton, Proc. Linn. Soc., New South Wales, 1884, p. 369; Lodder, Proc. Roy. Soc., Tasm., 1900, Cat. Tasm. Shells (p. 12 of reprint); Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 403.

*Fossarina simsoni*, Tenison-Woods, Proc. Roy. Soc., Tasm., 1876, pp. 149, 150; Tenison-Woods, Proc. Roy. Soc., Vict., 1881, vol. xvii., p. 81; Tryon, Man. Conch., 1887, vol. ix., p. 275.

Glenelg Beach (W. L. Bragg); Henley Beach; St. Francis Island (Verco).

*Rissoina rhyllensis*, Gatliff and Gabriel.

*Rissoina rhyllensis*, Gatliff and Gabriel, Proc. Roy. Soc., Vict., 1908, vol. xxi. (N.S.), p. 367, pl. xxi., f. 8. *Type locality*.—Western Port, Victoria.

Dredged in Gulf St. Vincent, several; in 25 fathoms Thorny Passage, one alive, and one dead; one dead in 49 fathoms off Beachport, in 55 fathoms off Cape Borda, and in 90 fathoms off Cape Jaffa; in 110 fathoms off Beachport, forty, some quite fresh; in 130 fathoms off Cape Jaffa, seventeen good and poor; and in 150 fathoms off Beachport, thirteen, fairly good. It seems, therefore, to live in about 100 fathoms, and to be less frequent in the shallower and deeper water.

*Rissoina lintea*, Hedley and May.

*Rissoina lintea*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 117, pl. xxiii., f. 11. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Dredged at the same stations as the preceding species, but in smaller numbers.

*Turritella kimberi*, n. sp. Pl. xv., f. 14, 15.

Shell thin, long, narrow, imperforate, of ten whorls without the protoconch, which is absent. Another individual shows a long tapering protoconch of four smooth convex white whorls. Sutures deep. Spire-whorls well rounded; with equidistant, low, spiral ribs, six in the penultimate, the infrasutural one being the least valid, the upper slope of the rib very steep and short, nearly vertical, the lower long and sloping; the intercostal furrows appearing in the throat as opaque white capillary spiral lines. The body-whorl has ten spirals; base convex. Aperture slightly oblique, elliptical; outer lip thin, uniformly convex; inner lip a scarcely perceptible glaze on the body-whorl; columellar lip nearly straight, narrowly reflected; basal lip slightly effuse. Colour translucent white.

*Dim.*.—Length, 7·7 mm.; breadth, 1·7; length of aperture, 1·4 mm.; width, '9.

*Locality*.—Type, Backstairs Passage, 20 fathoms, with eight others fresh but dead. Port Willunga, one (Kimber).

Type in Dr. Verco's collection.

*Obs.*.—It may reach 8·5 mm. in length.

*Diagnosis*.—*Turitella parva*, Angas, differs in its brown colour and its light chestnut sutural band, its three keels on the whorls, its subquadrate aperture, and in its columella thickened and produced at the base.

*Seila attenuata*, Hedley, superficially resembles it, but differs in its anterior notch.

*Seila attenuata*, Hedley.

*Seila attenuata*, Hedley, Proc. Linn. Soc., New South Wales, 1900, vol. xxv., part 1, p. 91, pl. iii., f. 9, 9a. *Type locality*.—Middle Harbour, Sydney. Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1906, vol. xviii. (N.S.), part 2, p. 60., Ocean Beach, Point Nepean.

Newland Head, 20 fathoms, one dead; Backstairs Passage and Gulf St. Vincent, eighteen.

*Ovula formosa*, Adams and Reeve.

*Ovula formosa*, Adams and Reeve, Voy. Samarang, p. 22, pl. vi., f. 6; Tryon, Man. Conch., vol. vii., 1885, p. 251, pl. iv., f. 15, 16, "Borneo, Japan."

Dredged one example, during many years' dredging in waters from Beachport to the Neptunes, including Gulf St.

Vincent and Spencer Gulf. This was identified for me by Mr. Hedley, who suggested that as a tropical form it had migrated round the western coast of Australia to South Australia, not being found on the eastern coast. This was supported by the securing of a second specimen in better condition, in 30 fathoms, off St. Francis Island, in the Great Australian Bight, during one day's dredging.

*Negrina Septa petulans*, Hedley and May. 545

*Septa petulans*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 118, pl. xxiii., f. 14. Type locality.—Pirate's Bay beach, near Cape Pillar, Tasmania; also 100 fathoms off Cape Pillar.

I found a specimen some years ago on the beach at Eagle Hawk Neck, Tasmania, which is identical with the type (*teste* Hedley). Also dredged broken in 200 fathoms off Beachport.

*Cymatium columnarium*, Hedley and May.

*Cymatium columnarium*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 119, pl. xxiii., f. 15. Type locality.—100 fathoms off Cape Pillar, Tasmania. 550

Dredged in 40 fathoms off Beachport, one good; in 60 fathoms north-west of Cape Borda, one immature; in 100 fathoms off Beachport, one good (identified by C. Hedley from the type); in 110 fathoms off Beachport, one good; in 130 fathoms off Cape Jaffa, one good, immature; in 150 fathoms off Beachport, one poor, and in 200 fathoms off Beachport, two poor.

*contingens* *Pyrene plexa*, Hedley.

*Columbella plexa*, Hedley, Proc. Linn. Soc., New South Wales, 1901, part 4, p. 702, f. 25. Type locality.—Port Jackson: Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 112, 100 fathoms off Cape Pillar, Tasmania. 622

Dredged in 104 fathoms, 35 miles south-west of Neptune Islands, fourteen examples.

*Arcularia mobilis*, Hedley and May.

*Arcularia mobilis*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, p. 121, pl. xxiii., f. 16, with var. *costata*, f. 17. Type locality.—100 fathoms, off Cape Pillar, Tasmania.

Dredged in 100 fathoms off Beachport, one immature; in 130 fathoms off Cape Jaffa, twelve, some good, mostly poor; in 150 fathoms off Beachport, two nearly mature; in 200 fathoms off Beachport, one immature. No examples were taken alive. They do not quite conform either to the type or the variety. As regards the axial costæ they are intermediate, and the spirals are sharper, and wider apart than in either form.

One shell, taken in 150 fathoms off Beachport, is much more attenuate than the type. This measures 7 mm. by 4 mm., whereas that is 6 mm. by 2·9 mm.

*Fax Arcularia* grandior, n. sp. 631

Plate xv., f. 16, 17.

Shell large and solid. Whorls nine. Protoconch  $2\frac{1}{4}$  turns, smooth; apex scarcely exsert; first whorl depressedly convex, second vertically flatly convex. Spire-whorls convex, shouldered; the angulation starting in the first whorl close to the suture, proportionately more distant from it and less acute in each succeeding whorl, in the penultimate just above the middle. Suture distinct, undulating, narrowly margined. Body-whorl scarcely shouldered. Aperture axially obliquely ovate; outer lip simple, thin, in profile slightly centrally concave; columella concave, obtusely angled at the commencement of the canal which deviates well to the left and is recurved; inner lip, a smooth glaze, complete; notch marked. Sculpture bold; axial costæ, 16 in the penultimate, extending from suture to suture, acute, concavely rounded, as wide as the interspaces, and narrowing over the base to the notch; spirals valid, sharp, concavely rounded, as wide as the spaces, crossing and transversely tuberculating the axials, three in the first whorl, six principals in the penultimate with three intercalated secondaries, 20 altogether in the body-whorl extending validly to the notch; irregular crowded interstitial accremental striae.

*Dim.*—Length, 32·5 mm.; of body-whorl, 13 mm.; width, 15 mm.

*Locality*.—Dead in blue clay in 110 fathoms off Beachport, 3 large; 100 fathoms, 3 fragments; 150 fathoms, 3 fresh, juvenile; 200 fathoms, 2 fresh, juvenile; off Cape Jaffa, in 300 fathoms, 2, juvenile; off Cape Borda, in 55 fathoms, 1 embryonic.

Type in Dr. Verco's collection.

*Obs.*—A second individual, figured (pl. xv., f. 17), is rather less elate, and the angled shoulder is more persistent. The type is stained blue, but another example is of a light-yellowish-brown tint.

*Coralliphila elaborata*, H. and A. Adams.

*Coralliphila elaborata*, H. and A. Adams, Proc. Zool. Soc., Lond., p. 433. *Type locality*.—"Sandwich Islands." Gatliff and Gabriel, Proc. Roy. Soc., Vict., 1908, vol. xxi. (N.S.), part 1, p. 369, "San Remo and Lorne."

Taken at St. Francis Island, west coast of South Australia, alive in a rock pool, and dead in numbers. Some

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specimens are quite white, but others are of a deep bluish-purple in the aperture and on the columella, and the colour is faintly visible through the shell. The largest example is 26 mm. long, and 16 mm. in its greatest diameter.

This species was kindly identified by Mr. Gatliff, from Victorian specimens, compared with the British Museum type by Mr. Gabriel, with Mr. E. A. Smith's help.

**Coralliophila rubrococcinea**, Melvill and Standen.

*Coralliophila rubrococcinea*, Melvill and Standen, Proc. Zool. Soc., Lond., 1901, p. 401, pl. 21, f. 2. *Type locality*.—“Persian Gulf.” Gatliff and Gabriel, Proc. Roy. Soc., Vict., 1908, vol. xxi. (N.S.), part 1, p. 368, “Port Fairy and San Remo, Victoria.”

Port MacDonnell Beach.

Identified by Mr. Gatliff, as in the previous species.

**Trophon columnarius**, Hedley and May.

*Trophon columnarius*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 121, pl. xxiv., f. 22. *Type locality*.—100 fathoms off Cape Pillar, Tasmania.

Dredged in 40 fathoms off Beachport, three good (one identified by C. Hedley, from type in Austr. Mus.).

**Trophon molorthus**, Hedley and May.

*Trophon molorthus*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 122, pl. xxiv., f. 23. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Dredged in 150 fathoms off Beachport, five; in 200 fathoms, five; also, in 130 fathoms off Cape Jaffa, three: all dead shells; identified by C. Hedley, from type in Austr. Mus., Sydney.

**Marginella columnaria**, Hedley and May.

*Marginella columnaria*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 120, pl. xxiii., f. 19. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Dredged in Gulf St. Vincent at depths below 25 fathoms, one alive, six good, ten poor; in Backstairs Passage, 22 fathoms, five alive, and in 12, 15, 17, and 20 fathoms, eight dead; in 40 fathoms off Beachport, three good, three poor; in 45 fathoms east of Neptune Islands, one good, immature; in 55 fathoms north-west of Cape Borda, two good and four immature; and in 90 fathoms off Cape Jaffa, one very poor. This species seems, therefore, to live chiefly at about 20 fathoms, and beyond 60 fathoms to be found only in poor condition.

**Limæa parvula**, sp. nov. Pl. xv., f. 10 to 13.

Shell small, thin, white; obliquely oval. Umbos central, inflated, projecting approximate. Hinge-margin straight;

dorsal area transversely elongate, narrowly triangular. Anterior dorso-lateral angle obtuse, about 135 deg.; posterior about 100 deg. Anterior border slightly concave for about one-fourth of its length, then uniformly slightly convex. Posterior border much shorter, at first sub-concave, then nearly straight. Ventral border semicircular, joining the anterior border with a more open sweep than the posterior. Surface convex; with sixteen radial ribs, smooth, rounded, nearly as wide as the interspaces, with several intercalated riblets. Concentric striae granulate the intercostal spaces, and form sublenticular costulae on the sides, more marked on the anterior, near the dorsal border.

The cartilage-pit is sub-central, and triangular crossing the dorsal area to the umbo, concave. Hinge-plate narrow near the pit, widest at the angles; teeth about seven on each side, diverging, extending slightly along the lateral borders.

Interior slightly furrowed by the ribs. Ventral border squarely denticulated.

*Dim.*—Umbo-ventral diameter, 3·5 mm.; 3·7 mm., including the umbo: antero-posterior, 3 mm.

*Hab.*—Type locality, 104 fathoms, 35 miles south-west of Neptune Islands, 40 valves; 90 fathoms off Cape Jaffa, 1 valve.

Type in Dr. Verco's collection.

***Mytilicardia crassicosta*, Lamarck.**

*Cardita crassicosta*, Lamarck, Anim. S. Vert., 1819, vol. vi., pt. 1, p. 24, No. 13.

*Cardita citrina*, Lamarck, *op. cit.*, p. 637, No. 21.

*Cardita crassicostata*, Reeve; Conch. Icon., 1843, vol. i., pl. 2, f. 7, a, b, c, d, e.

*Cardita tridacnoides*, Menke; Moll. Nov. Holl., 1843, p. 39, No. 222.

Dredged alive at all depths from 8 fathoms to 24, in both Gulfs and Straits. Very young individuals have been taken alive in 45 fathoms off Beachport and east of the Neptunes, and in 55 fathoms off Cape Borda. Small valves occur in numbers in 100 and 110 fathoms off Beachport, and in 130 fathoms off Cape Jaffa. It would appear as if very few mature shells are found above 15 fathoms, though the range of the smaller individuals extends to over 50 fathoms.

Some small specimens are of a uniform rosy-pink colour; others have the dorsal two-thirds of the posterior half of a very dark-brown internally. The ventral border may be quite straight, or very deeply excavate in front of its centre. There may be a sort of dorsal fin just in front of the posterior-dorsal angle, due to expansion of a radial rib. The shell may be elongate transversely and low umbo-ventrally, or short

and very high. The ribs may be acute and scaly, or may become nearly obsolete, especially behind the umbo-ventral ridge.

It may attain a transverse length of 65 mm., 10 mm. more than that of Lamarck's type. This may vary considerably in proportion to the umbo-ventral height, as may also the prominence of the curved costal scales.

**Mytilicardia calyculata**, Linnaeus.

*Chama calyculata*, Linnaeus; Syst. Nat., 1767, p. 1138.

*Cardita calyculata*, Lamarck; Anim. S. Vert., 1819, vol. vi., part 1, p. 24.

*Cardita aviculina*, Lamarck; op. cit., p. 26, No. 20.

*Cardita excavata*, Deshayes; Proc. Zool. Soc., Lond., 1852, p. 100, pl. xvii., f. 1-3.

*Mytilicardia tasmanica*, Tenison-Woods; Proc. Roy. Soc., Tasm., 1876, p. 161.

Taken on the beach at Venus Bay, West Coast of South Australia; very rarely dredged.

**Mytilicardia concamerata**, Chemnitz.

*Cardita concamerata*, Reeve, Mon., t. 9, f. 42.

*Thecalia macrotheca*, A. Adams and Angas, Proc. Zool. Soc., Lond., 1864, p. 39.

*Mytilicardia concamerata*, Chemnitz, Tate, Trans. Roy. Soc., S. Austr., vol. ix., 1886, p. 100.

The habitat is given as "under stones at low tide," "Rapid Bay, South Australia" (Coll. Angas). But there were no specimens in Tate's collection. I have not taken it anywhere, nor has any collector other than Angas recognized it. It does not appear to have been recorded from Victoria, Tasmania, or Western Australia. Possibly some shells from elsewhere were by mistake placed among those in Angas's collection from South Australia.

**Venericardia dilecta**, E. A. Smith.

Pl. xiv., f. 8.

*Cardita dilecta*, E. A. Smith; Challenger Rep., Zool., 1885, vol. xiii., p. 213, pl. xv., f. 4, 4a. *Dim.*—Length 8 mm., height 6 mm., diameter 5·5. *Hab.*—"Off East Monceur Island, Bass Strait," in 38 to 40 fathoms.

This has been dredged in Backstairs Passage in 17 fathoms, two alive and many valves; in 22 fathoms, two alive and forty-eight valves; and in Gulf St. Vincent, depth unnoted, many alive and dead; in 25 fathoms off Beachport, two poor valves; in 45 fathoms east of the Neptune Islands, one alive and eighteen valves; in 55 fathoms off Cape Borda, two poor valves; in 100 fathoms off Beachport, eight valves in poor and nine in moderate condition; in 130 fathoms off Cape

Jaffa, one whole shell and one valve, both in poor condition. This species would seem to live in water up to 45 fathoms, but not beyond. Its limit in shallow water below 17 fathoms is unknown.

My examples are 8·2 mm. by 6·7, and 8·1 by 6·9 mm., and are, therefore, proportionately somewhat higher than the type, but otherwise correspond. One is 9·25 mm. by 7·5, a large specimen.

**Venericardia dilecta**, E. A. Smith. Var. **excelsior**, var. nov.

Pl. xiv., f. 9.

It closely resembles *C. dilecta*, Smith; but is rather more ventricose, is less equilateral, the umbo being more anterior, the post-dorsal border is longer and less sloping, the umbo-ventral depth is greater, the ribs are not quite so valid, the ventral margin is more curved, it has not the pink tinge about it, it is blotched and articulated with a darker brown.

*Dim.*—Length, 7·8 mm.; height, 7·3 mm.

*Hab.*—55 fathoms off Cape Borda, one valve; 100 fathoms off Beachport, six alive, and more than 750 valves quite fresh; 130 fathoms off Cape Jaffa, four alive, thirty-three valves quite fresh; 150 fathoms off Beachport, one alive, 750 valves; 200 fathoms off Beachport, forty-nine valves, and one alive. The proper habitat of this shell is evidently from 100 to 150 fathoms, only one valve having been found at a less depth. This circumstance, with the hiatus of about 50 fathoms between it and *V. dilecta*, almost suggests its right to be considered a separate species.

It is much more orbicular than my specimens of *V. dilecta*, and still more so than the type. Curiously enough Mr. Smith's artist has drawn a figure which, instead of corresponding with the dimensions in his text, measures exactly 26·5 mm. both in height and length, so as to represent an orbicular shell, instead of 26·5 in length and 19·9 in height, which are the proportions of his described type.

Some of my specimens are quite white, and some have concentric bands of a less opaque white in them.

Type in Dr. Verco's collection.

**Venericardia amabilis**, Deshayes.

*Cardita amabilis*, Deshayes; Proc. Zool. Soc., Lond., 1852, p. 102, pl. xvii., f. 8, 9, *Hab.*—"New Zealand"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, part 3, p. 434, "South coast of Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xviii. (N.S.), part 1, p. 232, "Western Port, Victoria."

Dredged alive in Spencer Gulf in 17 fathoms and 20 fathoms, about two-thirds full-grown size; in 25 fathoms off Beachport, one small individual alive, also two valves full

grown; in 40 fathoms off Beachport, one alive, immature, and 152 valves, the largest being 22 mm. antero-posteriorly and 19.5 mm. umbo-ventrally; in 45 fathoms east of Nettunes, four valves; in 49 fathoms off Beachport, nine valves, half grown; in 62 fathoms north-west of Cape Borda, two valves; in 90 fathoms off Cape Jaffa, five alive up to 10 mm. in length, and 104 valves up to 12 mm.; in 100 fathoms off Beachport, one alive, immature, and 140 valves up to 13 mm. in length; in 130 fathoms off Cape Jaffa, very many valves; in 150 fathoms off Beachport, 107 valves; in 200 fathoms off Beachport, fifty-two valves up to 10 mm. in length. Its range in depth is considerable, up to 100 fathoms in life, and up to 200 fathoms as valves in quantity.

The smaller individuals appear to be comparatively longer; thus the measurements are 9.75 antero-posteriorly, 8.25 umbo-ventrally, 5.50 sectionally; then 12.5, 11.25, 8.25, and 17.5, 17.5.

This shell has been previously recorded for South Australia by Prof. Tate in Trans. Roy. Soc. S. Austr., 1888, vol. xi., p. 68, as *C. beddomei*, E. A. Smith, Chall. Rep. Zool., 1885, vol. xiii., p. 211, pl. xv., f. 5. But our shell is identical with shells from Tasmania and Victoria sent as *C. amabilis*, Desh., and I cannot recognize any specific distinction between our species and the description and figure of Deshayes, or between those of Deshayes and Smith. I think *V. beddomei* will prove to be a synonym of *V. amabilis*.

*Cardita gemmulifera*, Tate, Trans. Roy. Soc. S. Austr., 1892, vol. xv., p. 130, pl. i., fig. 9, is only a mild variant of the above, and cannot be granted specific position.

#### *Venericardia quoyi*, Deshayes.

*Cardita quoyi*, Deshayes; Proc. Zool. Soc., Lond., 1852, p. 103, no plate: *Hab.*—“New Holland”; Tate and May, Proc. Linn. Soc., New South Wales, 1901, part 3, p. 434, “Badger Island,” Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xviii. (N.S.), part 1, p. 232, “Flinders, Western Port,” Victoria.

*Cardita rosulenta*, Tate; Trans. Roy. Soc., S. Austr., 1887, vol. ix., p. 69, pl. v., f. 3, “Encounter Bay and Backstairs Passage.”

Dredged alive in Eastern Cove, Kangaroo Island, one specimen in 11, in 14, and in 19 fathoms; also in Backstairs Passage, two in 13 fathoms, two in 16 to 18 fathoms, three in 20 fathoms, and one in 22 fathoms. Valves only were taken in good condition in 25 fathoms off Beachport, two, and in 40 fathoms, twenty-four valves; in 55 and 60 fathoms off Cape Borda, eighteen; in 110 fathoms off Beachport, six; in fair condition in 130 fathoms off Cape Jaffa, six; in 150 fathoms off Beachport, one; and in 200 fathoms, two.

**Venericardia squamigera**, Deshayes.

*Cardita squamigera*, Deshayes; Mag. Zool., 1853, p. 10; Reeve, Conch. Icon., pl. iv., f. 14: *Hab.*—"Unknown"; Tate, Trans. Roy. Soc., S. Austr., 1888, vol. xi., p. 68, "Spence Gulf, off Kangaroo Island."

Dredged alive in Gulf St. Vincent, Spence Gulf, and in Backstairs Passage; four in 10 fathoms, five in 12, one in 15, two in 17, seven in 20, five in 22 fathoms. Valves were taken, but only of small size, as follows:—Seventeen in 55 fathoms and one in 62 fathoms off Cape Borda; one in 110 fathoms off Beachport; and two in 300 fathoms off Cape Jaffa. I have not collected it on any of our beaches.

It attains a length of 25 mm., with a height of 19 mm., nearly three times the dimensions given by Tate, *viz.*, three-eighths of an inch by a quarter of an inch, or 9 mm. by 6.

**Venericardia bimaculata**, Deshayes.

*Cardita bimaculata*, Deshayes; Proc. Zool. Soc., Lond., 1852, p. 101, pl. xvii., f. 4, 5: *Hab.*—"New Zealand, Coll. Cuming"; Tate, Trans. Roy. Soc., S. Austr., 1892, vol. xv., p. 134, records it for South Australia, and says "it is not admitted by Prof. Hutton in his revised list of New Zealand Mollusca" as living in New Zealand; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 434, for Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xviii. (N.S.), part 1, p. 232, "Port Phillip and Western Port."

*Cardita gunni*, Deshayes; Proc. Zool. Soc., Lond., 1852, p. 101, *Hab.*—"Van Diemen's Land" (Coll. Cuming).

*Cardita atkinsoni*, Tenison-Woods; Proc. Roy. Soc., Tasm., 1876, p. 27, *Hab.*—"Long Bay, Tasmania."

This species varies greatly in shape; one may be 15·25 mm. antero-posteriorly, 12 mm. umbo-ventrally, and 7·75 in section, and another 13·75, 12·25, and 9·75 in its respective measurements. The difference is not due to age, for each form can be traced from minute to full size. But intermediate grades occur. The ribs may vary from 15 to 23.

Dredged alive in Gulf St. Vincent, Spence Gulf, Investigator Strait, and Backstairs Passage. Seven in 5 fathoms, sixty-two in 5 to 10 fathoms, twenty-seven in 10 to 15 fathoms, 134 in 15 to 20 fathoms, and sixty-four in 22 to 23 fathoms, one in 45 fathoms, off the Neptunes. Fifteen to 20 fathoms seems to be, therefore, its proper station, though one was taken alive in 40 fathoms off Beachport. Valves only were taken, sixty-five in 40 fathoms, eighteen in 55 fathoms, twelve in 60 fathoms, thirty in 100 fathoms, thirty-one in 130 fathoms, three in 150 fathoms, ten in 200 fathoms, and five in 300 fathoms.

**Venericardia lutea**, Hutton.

*Cardita lutea*, Hutton; Man. New Zealand Moll., 1880, p. 159: *Venericardia lutea*, Hutton, Hedley, Trans. New Zealand Inst., vol. xxxviii., 1905, p. 72, pl. i, f. 6.

Dredged 14 fathoms off Ardrossan, sixteen alive and several valves; 15 fathoms off Wallaroo, four alive and seven valves; 20 fathoms Gulf St. Vincent, two alive.

**Venericardia columnaria**, Hedley and May.

*Venericardia columnaria*, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 125, pl. xxv., f. 37-40. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

The South Australian shells are not quite so produced anteriorly as the type, and may have twenty-six ribs. They may reach 8·8 mm. in length and 7·7 mm. in height. Younger shells are comparatively more transverse. The colour is white, tinged with brown on the margins beyond the hinge plate; there may be brownish smears at both ends internally, or the pallial line and the muscle scars may be painted brown; or the outer surface may be faintly brown, most marked at the umbos.

Dredged in 40 fathoms off Beachport, five valves; in 49 fathoms, twelve valves; in 100 and 110 fathoms, very many valves; in 150 fathoms, seventy-six valves; and in 200 fathoms, seventeen valves; in 130 fathoms off Cape Jaffa, very many valves and one perfect shell. Its habitat is apparently from 100 to 150 fathoms.

**Venericardia delicata**, n. sp. Pl. xvi., f. 18, 19.

Shell rather thin, transversely oval, subequilateral. Umbos in front of centre, directed forward, rather prominent, approximate. Post-dorsal border sloping, barely concave, anterior concave. Front margin well curved, ventral less, posterior wider, somewhat truncately convex. Radial ribs twenty-four, narrower than their interspaces, high, closely and finely transversely scaled, denticulating the margins. Very fine accremental striae crowd the intercostal spaces, a larger one corresponding with each scale. Lunule narrowly cordiform, smooth, prominent in the centre. Left valve with two diverging cardinal teeth, tiny anterior lateral tooth in front of lunule; right valve with wide triangular cardinal, socket in front of lunule, minute posterior lateral. Interior white glistening, rayed by ribs, margins denticulated.

*Dim.*.—Antero-posterior diameter, 8·5 mm.; umbo-ventral, 7·2 mm.

*Colour*.—Sparsely irregularly dotted outside with brown.

A living example is of a light greyish tint, spotted with brown disposed somewhat concentrically, and has the lunule

chestnut brown; and is 6·3 mm. long, 5 mm. high, and 3·8 mm. in section.

*Hab.*—Type, 130 fathoms off Cape Jaffa, with several valves; 90 fathoms, two alive and eighty-four valves; 300 fathoms, many valves; 110 fathoms off Beachport, six valves; 150 fathoms, twenty-four valves; 200 fathoms, twenty-three valves; 104 fathoms, thirty-five miles south-west of Neptune Islands, one alive, and many fresh valves.

*Diagnosis.*—It is most like *Venericardia bimaculata*, Deshayes; but is a more delicate shell, has more and narrower ribs, which are much more closely and finely scaled. The same features distinguish it from *V. quoyi*, Desh., and *V. difficilis*, Desh.

Type in Dr. Verco's collection.

#### **Carditella exulata, E. A. Smith.**

*Carditella exulata*, E. A. Smith; Challenger Rep., Zool., 1885, vol. xiii., p. 215, pl. xv., f. 6, 6a. *Type locality*.—“Off Nightingale Island, Tristan d'Acunha, 100 to 150 fathoms.” *Dim.*—Length 4 mm., height 2·75, width 2 mm.

Our shells were taken in 130 fathoms off Cape Jaffa, four valves; 110 fathoms off Beachport, six valves; the beach at MacDonnell Bay in shell sand, many valves and one living individual; and at Kingston, Lacepede Bay, shell sand, many valves. I cannot detect any specific difference between these examples and Mr. Smith's, from his description and figure, except that ours are smaller, measuring 2·8 mm. by 1·8 mm. Some valves have the posterior part internally and the region of the lateral teeth stained brown. Tristan d'Acunha lies in about 12 deg. west longitude, and 37½ deg. south latitude, in the middle of the Atlantic Ocean. Beachport is in about 139½ deg. east longitude, and 37½ deg. south latitude. The latitude in which the type shells and ours were taken is, therefore, exactly the same; as is also the depth, 100 to 150 in the one case, and 110 in the other. These two circumstances might to some extent explain their identity. It will be noted, however, that most of our specimens were taken on the beach, where also the only living individual was secured. If the identification is correct, the distance between the two stations of 162 parallels of longitude, which at that latitude may be computed as about 9,000 miles, is very interesting.

#### **Carditella subtrigona, Tate.**

*Carditella subtrigona*, Tate, Trans. Roy. Soc., S. Austr., vol. ix., p. 70, pl. iv., f. 10. *Type locality*.—Streaky Bay, Great Australian Bight; Tate, op. cit., vol. xiv., p. 268.

Dredged alive at all depths from 17 to 24 fathoms in Gulf St. Vincent, Investigator Strait, and Backstairs Passage, as far out as Newland Head.

It may reach 10 mm. in length and 10 mm. in height. When young the shell is comparatively longer antero-posteriorly than when adult, the umbos seem to project more dorsally, and the sectional diameter is less, so that the juvenile form might be mistaken for another species. To the characters given by Tate may be added that the shell may be white with dark-brown muscle scars and hinge-plate and pallial line, and in addition some have all the inner ventral part from above the pallial line to the margin a deep purple-brown. Rarely the whole shell has a light purple tint.

**Carditella elegantula**, Tate and May.

*Carditella elegantula*, Tate and May, Proc. Linn. Soc., New South Wales, vol. xxvi., 1901, part 3, p. 434. *Type locality*.—Blackman's Bay, Tasmania.

Dredged alive in Backstairs Passage in 22 fathoms and in 18 fathoms; also in Investigator Strait, 22 fathoms; dead in Spencer Gulf; Port Willunga (Mr. Kimber).

**Carditella valida**, n. sp. Pl. xvi., f. 22 to 24.

Shell solid, obliquely transversely oval, somewhat produced anteriorly. Umbos prominent, curved forward, acute, approximate, with a minute prodissoconch cap. Post-dorsal border markedly convex; anterior concave; ventral convex, more curved in front than behind, crenulate. About nineteen valid axial ribs, rounded, interspaces very narrow. Valid close-set concentric round cords cross the costæ, scarcely visible in the interspaces. The right valve has a wide triangular cardinal tooth, an anterior lateral separated by a groove from the margin, and a posterior marginal lateral. The left valve has two diverging cardinals, of which the posterior is the larger, a posterior lateral separated by a groove from the margin and an anterior marginal lateral. The internal ventral border is well denticulated. Lunule cordiform, depressed, smooth. Escutcheon long, lanceolate. Ligament visible externally. Colour brownish, especially over the posterior third. Internally brown in the posterior part fading anteriorly, lateral teeth brown, and inside the ventral margin. It may be wholly white, or of a very light purple tint.

*Dim.*—Antero-posterior diameter, 3·7 mm.; umbo-ventral, 3·6 mm.

*Hab.*—Encounter Bay (Tate); Gulf St. Vincent, under 22 fathoms, several alive and many valves. Taken in small numbers and poor condition in 25, 40, 62, 110, and 130 fathoms, from Beachport west to the Neptune Islands.

*Diagnosis*.—It was recorded by Tate for South Australia as *C. infans*, E. A. Smith, in Trans. Roy. Soc., S. Austr.,

vol. ix., 1886, p. 100, and listed by Adcock in his Handlist, 1893, No. 146. Mr. Hedley has sent me Smith's species, obtained from the type locality, and it appears to have less curved dorsal borders and fewer ribs, which are scaled, and not corded.

It very closely resembles *C. elegantula*, Tate and May, of which it may prove to be only a variety, in which case its name will indicate the difference, for it has fewer and higher ribs, with bolder and less crowded concentric cords, and is somewhat less oblique.

Type in Dr. Verco's collection.

**Carditella vincentensis**, n. sp. Pl. xvi., f. 20, 21.

Shell solid, roundly trigonal. Umbos projecting, approximate, curved forward. Dorsal borders converge at about a right angle; posterior straightly convex, anterior slightly excavate. Lunule elongate-cordate, depressed, smooth, its centre prominent, and seen as a convexity in the profile of the shell. Escutcheon well marked, elongate, bevelled edges, left valve overlapping the right. Twenty-two flattened rounded ribs, the posterior straight, the anterior concave forwards, interstices linear. Well-marked concentric liræ cross the ribs and spaces. Right valve has a central triangular cardinal tooth, a long anterior lateral tooth separated from the margin by a groove, and a thin posterior marginal lateral. The left valve has two diverging cardinal teeth, a posterior lateral separated from the margin by a groove, and an anterior marginal lateral tooth. The lateral teeth and sockets are microscopically vertically striate. Ventral border well denticulated internally. Colour white, reddish-brown tint on the posterior third of the shell, deepest at the posterior inferior angle.

*Dim.*—Antero-posterior diameter, 3 mm.; umbo-ventral, 2·85 mm.

*Hab.*—Gulf St. Vincent, Spencer Gulf, and Backstairs Passage, 20 and 22 fathoms, several alive and many valves.

*Variations.*—The posterior dorsal border may be quite straight. The colour may be wholly white, the brown tint may be continued across the middle to the front border, or it may be disposed in radially elongate spots on the ribs.

*Diagnosis.*—From *C. elegantula* by its straighter posterior border, by the prominence of the centre of its lunule, by being more equilateral, and by its colour.

Type in Dr. Verco's collection.

**Cuna atkinsoni**, Tenison-Woods, sp.

*Kellia atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasm., 1877 (1876), p. 158. *Type locality.*—Long Bay, Tasmania.

*Carditella atkinsoni*, Tenison-Woods, Tate and May, Proc. Linn. Soc., New South Wales, vol. xxvi., 1901, part 3, p. 435, pl. xxvii., f. 107.

*Cuna atkinsoni*, Tenison-Woods, Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 113, 100 fathoms off Cape Pillar, Tasm.

Dredged Gulf St. Vincent, under 22 fathoms, many whole and valves; 110 fathoms off Beachport, one valve; 130 fathoms off Cape Jaffa, five good valves.

Some examples have very fine concentric striæ and fewer marginal denticulations; others seem very solid, probably from senility; and one variety is much narrower and more solid, and has a broad solid hinge-plate; but the examples were too few to create a new species from them.

#### *Cuna hamata*, Hedley and May.

*Cuna hamata*, Hedley and May. Records Austr. Mus., vol. vii., No. 2, 1908, p. 124, pl. xxv., f. 33-36. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Dredged off Beachport in 40 fathoms, one alive, eighty-six good valves; 49 fathoms, ten poor valves; 100 fathoms, fifteen good valves; 150 fathoms, sixty-five good valves; north-west of Cape Borda, 62 fathoms, ten poor valves; off Cape Jaffa, 130 fathoms, thirty-nine good valves. It has evidently a wide range in depth, though none were taken in 200 or 300 fathoms.

During life it is of a translucent horn colour, opaque white when dead.

#### *Cuna obliquissima*, Tate, sp.

*Cardita obliquissima*, Tate, Trans. Roy. Soc., S. Austr., vol. ix., 1887, p. 70, pl. v., f. 9. *Type locality*.—22 fathoms, Encounter Bay.

Dredged at different depths in Gulf St. Vincent and Backstairs Passage; seven miles south-west of Newland Head in 20 fathoms, one alive, of faint pink tint; off Beachport in 40 fathoms, twelve good valves; in 49 fathoms, seventeen poor valves; off Cape Borda in 55 fathoms, one whole and twenty-five good valves; in 62 fathoms, four whole and three valves, all poor; off Beachport in 110 fathoms, nine valves, in moderate condition; in 150 fathoms, two valves, moderate. This lives chiefly in water up to 25 fathoms, and is in poor state above 60 fathoms, and not found above 150.

In addition to the stout "four or five radial riblets" on the posterior slope noted by Tate, living shells show fine axial riblets over the whole surface, quite to the anterior margin. The "distant concentric grooves" do not correspond in direction with the fine microscopic accremental striæ, but cut them obliquely from the front downwards and backwards,

and each one slightly notches the ventral margin on its outer aspect, the notches of successive grooves being more anterior. In very young living shells the grooves are very deep at the anterior margin, so as to form distinctly projecting lamellæ here. The prominent prodissoconch is well preserved as a tiny concentrically hollowed cap.

**Cuna delta**, Tate and May, sp.

*Carditella delta*, Tate and May, Trans. Roy. Soc., S. Austr., vol. xxiv., 1900, p. 102.

*Cuna delta*, Tate and May, Verco, Trans. Roy. Soc., S. Austr., vol. xxxi., 1907, p. 109. See references there.

Dredged also in 104 fathoms, thirty-five miles south-west off Neptunes, and in 130 fathoms off Cape Jaffa, one valve at each station. Its habitat is evidently in the shallower water, not beyond 22 fathoms.

**Cuna cessens**, n. sp. Pl. xiv., f. 4 to 7.

Shell rather thin, trigonal, almost equilateral. Umbonal angle rather less than a right angle. Apex capped by a minute prodissoconch. Dorsal borders nearly straight, the posterior barely excavate, the anterior barely convex. Anterior and posterior ventral angles well marked. Ventral border convex, not crenulated. Exterior dull, rough, sordid, with about ten obsolete radials; and several concentric imbrications or growth-rests, besides obsolete accremental striation. Anterior and posterior sides somewhat excavate into long lunule and escutcheon, the posterior more deeply than the anterior. The right valve has a large triangular cardinal tooth, and a small posterior above and behind the ligamental pit. The left valve has a large anterior cardinal, and a depression behind the socket of the right wedge tooth for the ligament, separated by a tooth, and a small one above and behind the pit. Each valve has a marginal lateral, and a lateral separated from the margin by a groove. The internal ventral border is not denticulate. The interior is white with the ribs and imbrications visible through the shell. Colour is a dull light horn tint.

*Dim.*—Antero-posterior diameter, 1·8 mm.; umbo-ventral, 2·1 mm.: sectional, .9 mm.

Dredged in Backstairs Passage, 22 fathoms, several alive and valves.

*Diagnosis*.—Its closest ally is *C. delta*, Tate and May; but it is less solid, has a wider umbonal angle, has a smaller sectional diameter, has the concentric rest gradations, and no marginal denticulations.

Type in Dr. Verco's collection.

**Cuna concentrica**, Hedley.

*Cuna concentrica*, Hedley, Mem. Austr. Mus., vol iv., 1902, p. 315; Verco, Trans. Roy. Soc., S. Austr., vol. xxxi., p. 109, q.v.

**Cuna edentata**, n. sp. Pl. xiv., f. 1 to 3.

Shell ovate-trigonal, white, glossy, solid. Anterior and posterior lateral borders nearly straight, the latter rather shorter. Ventral border convex, slightly produced anteriorly. A small prominent prodissoconch cap, about three-fourths of a circle. Exterior has crowded concentric valid ribs, but no radial sculpture. The right valve has a large central triangular tooth, a minute anterior, at the extremity of the long antero-lateral tooth, which is separated by a groove from the margin, a marginal postero-lateral, with a minute cardinal tooth above it, and above that a marginal socket for the left posterior cardinal. The left valve has a large anterior cardinal tooth, and a small posterior behind the cartilage-pit, a long low postero-lateral tooth separated by a groove from the margin, and a marginal antero-lateral.

The inner ventral border is not dentated, whence the name.

*Dim.*—Antero-posterior diameter, 1·6 mm.; umbo-ventral, 1·9 mm.

*Hab.*—Gulf St. Vincent, dredged several.

*Diagnosis.*—It is very like *C. concentrica*, Hedley, but the smooth internal ventral border distinguishes it.

Type in Dr. Verco's collection.

**Cuna comma**, n. sp. Pl. xvii., f. 29 to 31.

Shell solid, white, glossy, obliquely pyriform, with a distinct three-quarter circle prodissoconch. Antero-lateral border convex; postero-lateral concave below the umbo, then straight, much shorter; ventral border convex produced anteriorly. Outer surface closely concentrically ribbed, no radial sculpture. The right valve has a large central curved cuneate tooth in front of the cartilage-pit, and a small posterior tooth just below the umbo, with a little socket outside and below it. The left valve has a large curved anterior tooth, a lamina in front of the cartilage-pit, a small posterior tooth behind the pit, and a small socket above and in front of it. The antero-lateral in the right valve and the postero-lateral in the left are separated from the margin by a groove to receive the corresponding marginal lamina of the other valve. The internal ventral border is not denticulated.

*Dim.*—Antero-posterior diameter, 2·6 mm.; umbo-ventral, 3·2 mm.

*Hab.*—Dredged alive in 22 fathoms in Backstairs Passage, and in 20 fathoms off Newland Head; also in Gulf St.

Vincent, very many; in 40, 45, 49, 55, 62, 110, and 130 fathoms, from Beachport to the Neptune Islands, but mostly in poor condition.

*Diagnosis.*—From *C. concentrica*, Hedley, by its curved lateral and non-denticulated ventral borders; from *C. edentata*, by its larger size and curved lateral borders; from *C. atkinsoni*, by the character of the hinge and the non-denticulated border.

Type in Dr. Verco's collection.

**Condylocardia subradiata**, Tate, sp. Pl. xvii., f. 25 to 28.

*Carditella subradiata*, Tate, Trans. Roy. Soc., S. Austr., vol. xi., 1888, pl. xi., f. 7. *Type locality.*—Shell sand, Royston Head.

Dredged off Royston Head, 20 fathoms, one alive, large; Backstairs Passage, 22 fathoms, one alive and six valves; off Beachport in 40 fathoms, fourteen valves; in 49 fathoms, very many valves, good; in 110 fathoms, nine whole and very many valves; in 90 fathoms off Cape Jaffa, many valves; east of North Neptune Island in 45 fathoms, one whole, three valves, all poor; north-west of Cape Borda in 62 fathoms, five alive and many valves, good; thirty-five miles south-west of Neptune Islands in 104 fathoms, four valves, poor. It seems to live in water from 20 to 100 fathoms.

Its generic location has been changed. Tate did not allude to its dentition in his description, and only the external surface was figured. His type, which is the only example in his collection, was fixed on a card to show the outer surface, and was regarded by him as a left *Carditella* valve, produced posteriorly; but it proves to be a right *Condylocardia* valve, produced anteriorly. It has a distinct prodissococh scale, separated by a narrow groove from the hinge-plate below. A large subcentral cartilage pit is bounded in front by a comparatively long diverging cardinal tooth, and behind by a thinner, lower, and shorter diverging lamina. The long antero-lateral tooth is separated from the margin by a groove, and the postero-lateral tooth is marginal.

Two other valves have furnished the illustrations of the hinge of this species, which may be more fully described thus: accepting Bernard's conclusion for his genus that the anterior is the produced side. The right valve has a diverging front cardinal tooth, and a long antero-lateral separated from the margin by a groove; this receives the antero-lateral marginal lamina of the left valve; this lamina is continued as a sort of hook round the dorsum of the right cardinal, and as a diverging left cardinal down its posterior side, where it rests on a low narrow shelf at the base of, and forms the socket of, the right cardinal and also the anterior wall of

the central cartilage pit. The left valve has a posterior diverging cardinal tooth, and a long postero-lateral tooth separated from the margin by a groove, which receives the postero-lateral marginal lamina of the right valve. The socket of this cardinal is completed by a diverging tooth in the right valve, lying anterior to it, where it rests on a low ledge, and so forms also the posterior wall of the cartilage pit; this is completed dorsally by a horizontal projection forwards from the right posterior cardinal just beneath the edge of the prodissoconch, where there is a horizontal groove in each valve.

**Condylocardia compressa**, Hedley and May, sp.

*Cuna compressa*, Hedley and May. Records of the Australian Museum, vol. vii., No. 2, 1908, p. 124, pl. xxiv., f. 29, 30, 31, 32. *Type locality*.—100 fathoms, off Cape Pillar, Tasmania.

Dredged off Beachport in 40 fathoms, three alive and ninety valves; in 49 fathoms, one whole and fifty valves; in 110 fathoms, one whole, twenty-seven valves, several of them poor; in 150 fathoms, twenty-five valves, rather poor; in 200 fathoms, two valves, poor; north-west of Cape Borda in 62 fathoms, twenty-three valves; and off Cape Jaffa in 130 fathoms, one valve. In 40 fathoms would appear to be its real habitat.

It comes very close to *C. subradiata*, Tate, but its greater number of less valid ribs and its more transverse shape when young distinguish it.

I suggested to Mr. Hedley that this species is a *Condylocardia* and not a *Cuna*; and he has re-examined the dentition and concurs in its generic transference. It is comparatively a gigantic species for the genus, which contains (with the exception of *C. subradiata*, Tate) only minute shells.

**Condylocardia ovata**, Hedley.

*Condylocardia orata*, Hedley, Proc. Linn. Soc., New South Wales, 1905, part 4, vol. xxx., p. 589, pl. xxxi., f. 5, 6; Verco, Trans. Roy. Soc., S. Austr., 1907, vol. xxxi., p. 109.

**Condylocardia trifoliata**, Hedley.

*Condylocardia trifoliata*, Hedley, Proc. Linn. Soc., 1906, vol. xxxi., p. 475; Verco, Trans. Roy. Soc., S. Austr., 1907, vol. xxxi., p. 109.

**Condylocardia pectinata**, Tate and May.

*Carditella pectinata*, Tate and May, Trans. Roy. Soc., S. Austr., 1900, vol. xxiv., p. 103. *Type locality*.—"Derwent Estuary, Tasmania" (W. L. May); Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 435, pl. xxvii., f. 96, 97.

*Condylocardia pectinata*, Tate and May, sp., Hedley, Mem. Austr. Mus., 1902, vol. iv., part 5, p. 318, "63-75 fathoms, off

Port Kembla, and in Sydney Harbour;" Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xvii. (N.S.), part 1, p. 231, "Dredged off Ryall, Western Port."

Dredged in 22 fathoms Backstairs Passage, several; also alive and valves in Spencer Gulf and Gulf St. Vincent at unrecorded depths. Taken on Kingston Beach whole and as valves.

**Condylocardia porrecta**, Hedley.

*Condylocardia porrecta*, Hedley, Proc. Linn. Soc., New South Wales, 1906, vol. xxxi., part 3, p. 475, pl. xxxviii., f. 24. *Type locality*.—"Mast Head Reef, Queensland."

Dredged Gulf St. Vincent below 22 fathoms, several alive. One small individual has only twelve ribs.

**Condylocardia australis**, Bernard.

*Condylocardia australis*, Munier-Chalmas (*nomen*), Bernard; Etudes Comparatives sur La Coquille des Lamellibranches Condylocardia, Paris, 1896, p. 12, pl. vi., f. 4. *Type locality*.—Ile St. Paul (M. Velain).

Dredged Gulf St. Vincent, several whole and valves.

The South Australian shell is scarcely as transverse as that figured, and is more crenulated at the margin, but Bernard describes his as "*margo ventralis crenatus*," and this character varies in our specimens, as do also the wideness and roundness of the radial ribs.

St. Paul Island, if that situated in the Atlantic is referred to, is very distant; but no further than several other accredited specimens extend.

**Condylocardia crassicosta**, Bernard.

*Condylocardia crassicosta*, Bernard; Etudes Comparatives sur La Coquille des Lamellibranches Condylocardia, Paris, 1896, p. ii., pl. vi., f. 1. *Type locality*.—Stewart Island (M. Filhol), New Zealand, taken in 35 fathoms.

Dredged in Backstairs Passage 22 fathoms, several alive; also in Spencer Gulf and Gulf St. Vincent. Received from Mr. C. J. Gabriel, under the name of *C. pectinata*, taken at Frankston, Port Phillip, and Westport Bay. It differs from *C. pectinata* in the smaller number of ribs, seven to ten only, in their greater height, and in the shape of the shell.

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EXPLANATION OF PLATES.

PLATE XIV.

1. *Cuna edentata*, Verco, exterior.
- 2, 3. " " interior.
4. " *cessens*, Verco, exterior.
5. " " side view.
- 6, 7. " hinge.
8. *Venericardia dilecta*, E. A. Smith, exterior.
9. " " var. *excelsior*, Verco, exterior.

## PLATE XV.

10. *Limaea parvula*, Verco, exterior.
11. " " " interior.
- 12, 13. " " hinge.
14. *Turritella kimberi*, Verco.
15. " " protoconch.
16. *Arcularia grandior*, Verco.
17. " " " a variant to show the aperture.

## PLATE XVI.

18. *Venericardia delicata*, Verco, interior.
19. " " exterior.
20. *Carditella vincentensis*, Verco, exterior.
21. " " interior.
22. " *valida*, Verco, exterior.
- 23, 24. " " hinge.

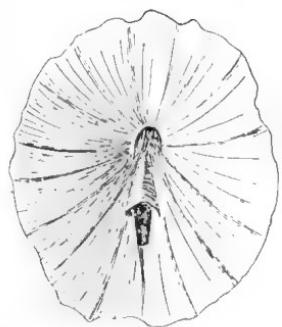
## PLATE XVII.

25. *Condylocardia subradiata*, Tate, type shell, exterior
26. " " interior.
- 27, 28. " " " not the type shell, showing the hinge.
29. *Cuna comma*, Verco, exterior.
- 30, 31. " " hinge.

## PLATE XVIII.

- 32, 33. *Turbo jourdani*, Kiener, operculum.
- 34, 35. " *stamineus*, Martyn, "
- 36, 37. " *gruneri*, Philippi, "
- 38, 39. " *undulatus*, Martyn, "

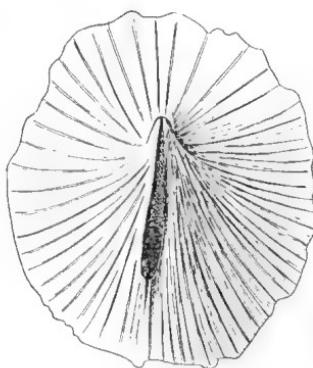
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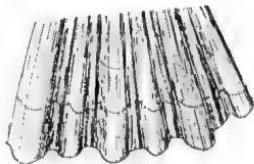
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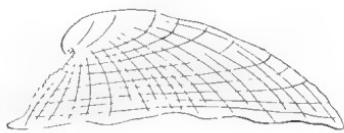
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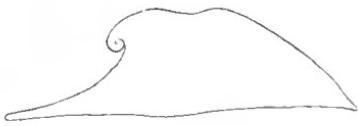
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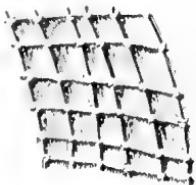
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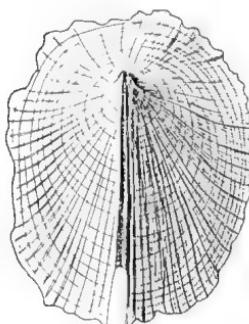
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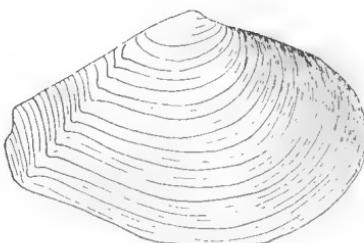
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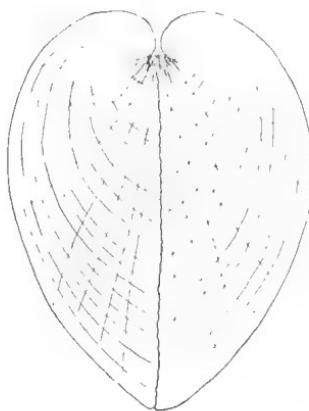


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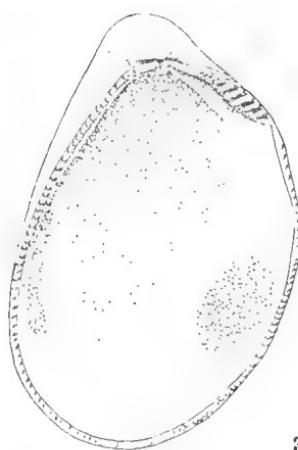




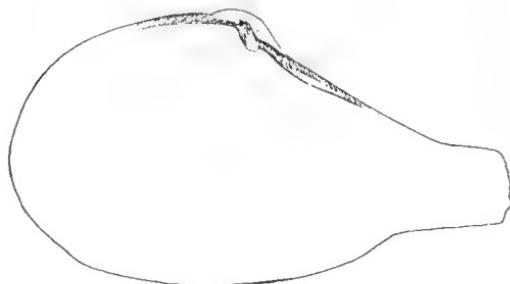
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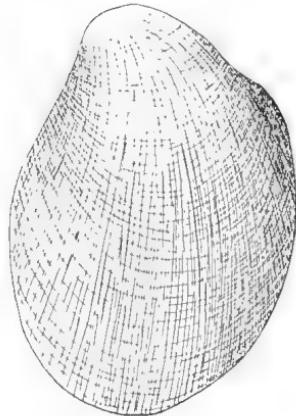
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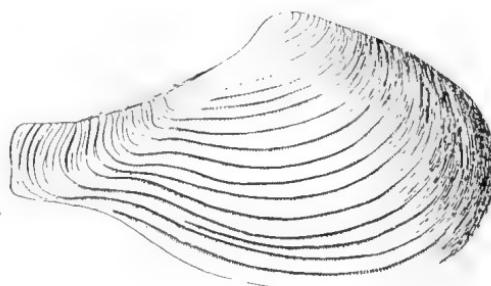
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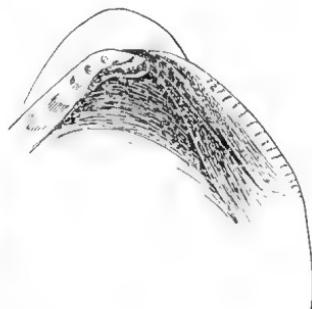
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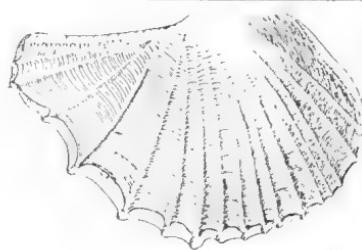
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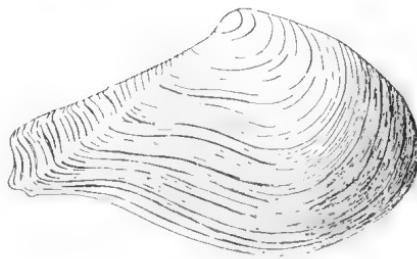


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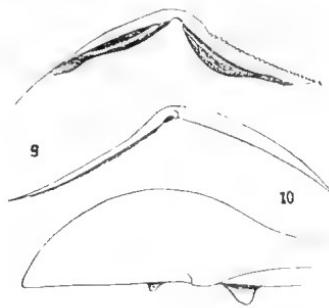
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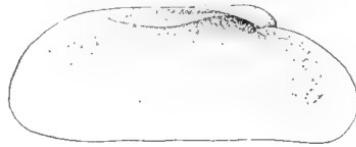
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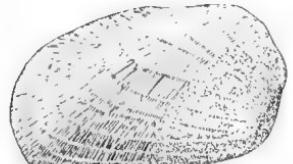
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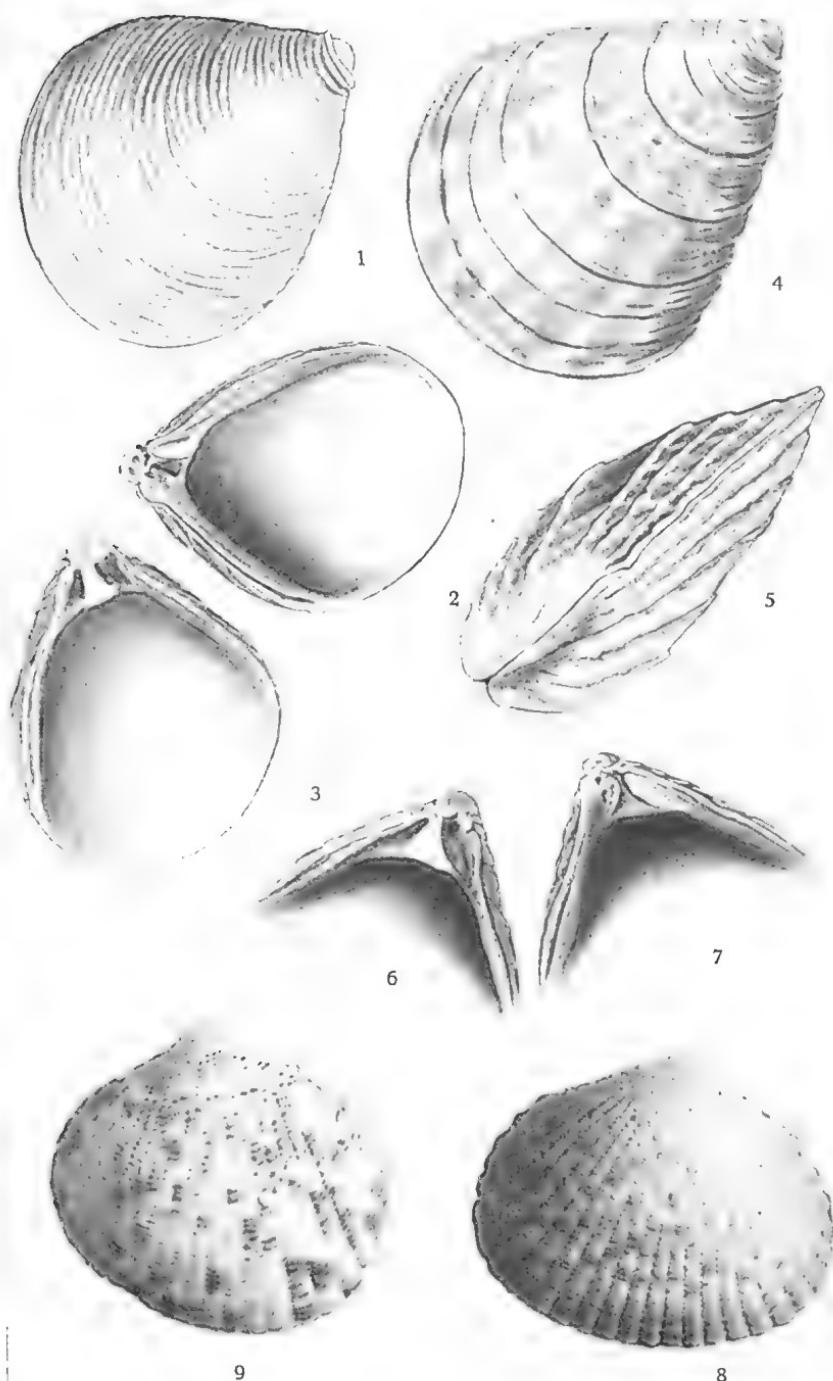


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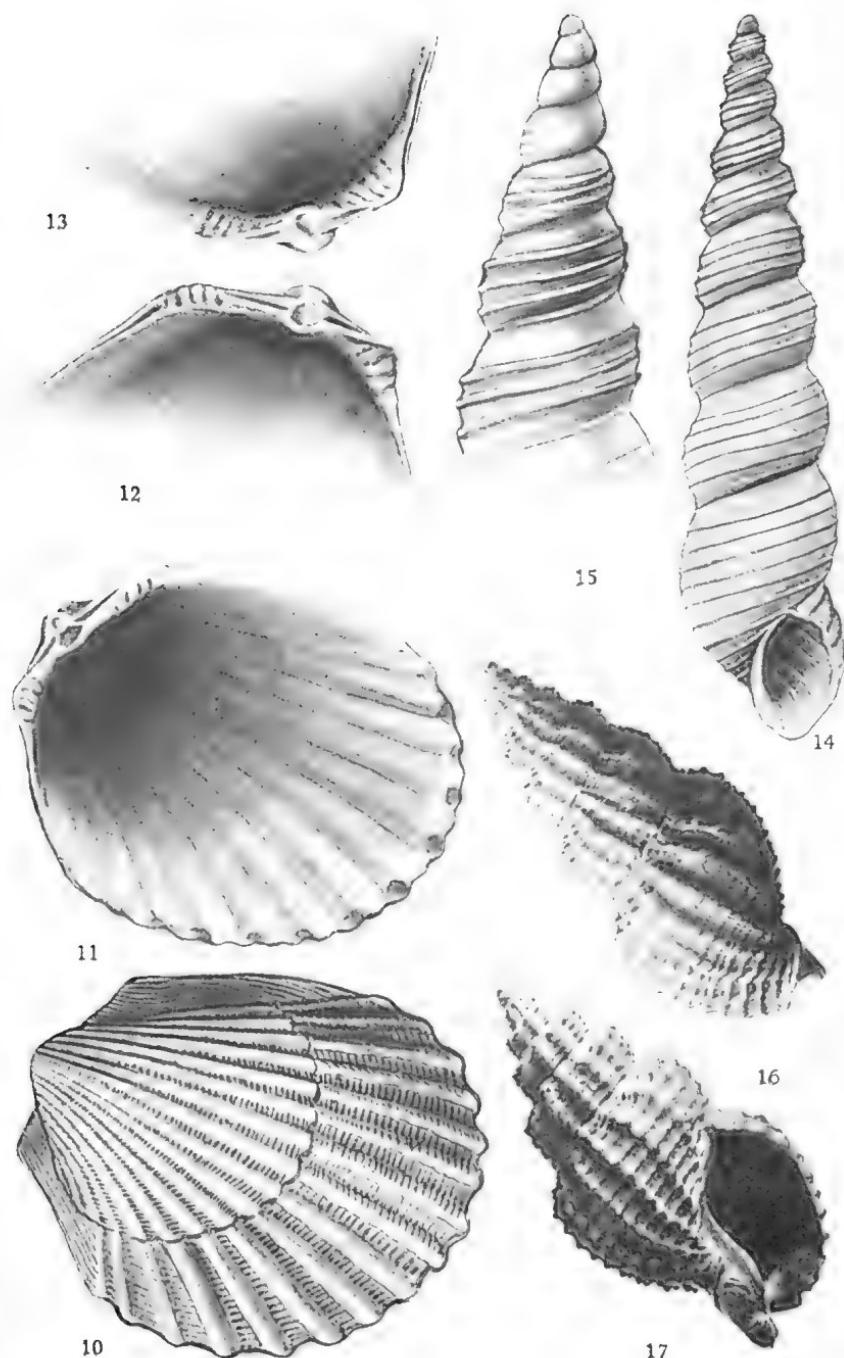


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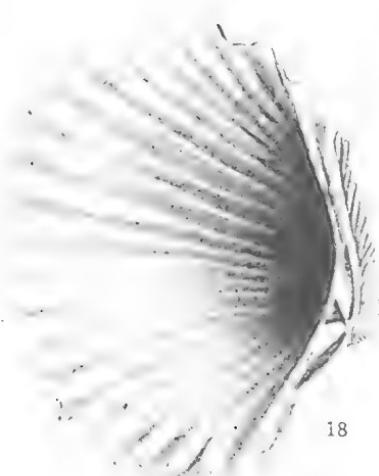




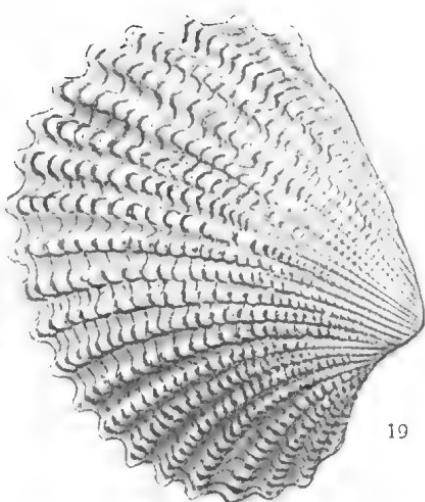




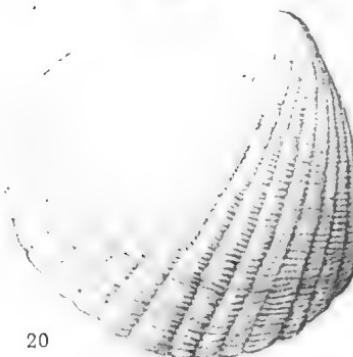




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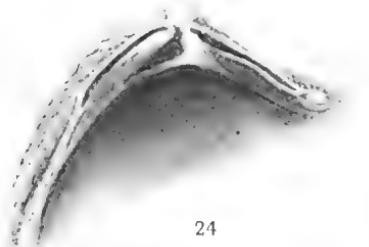
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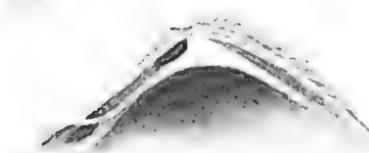
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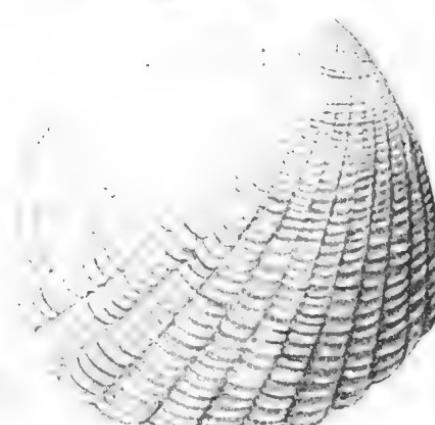
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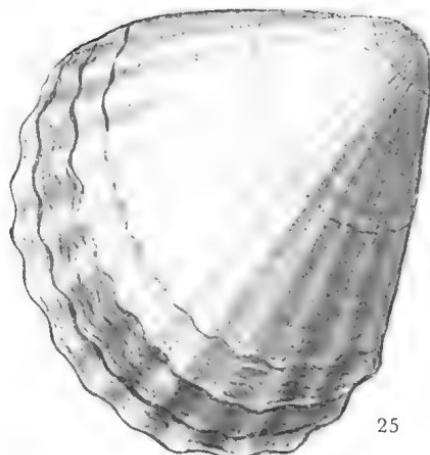


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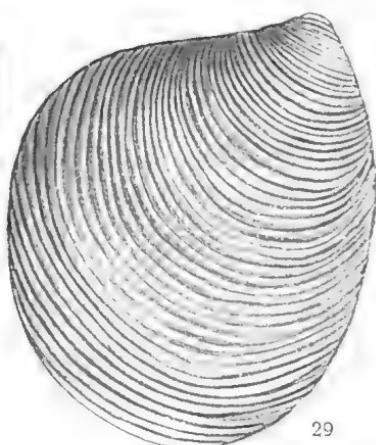


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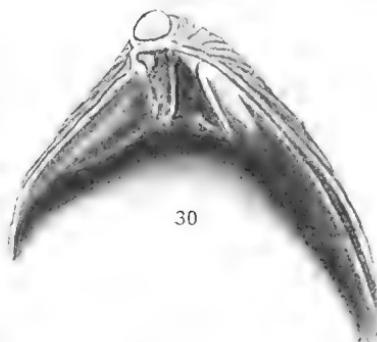
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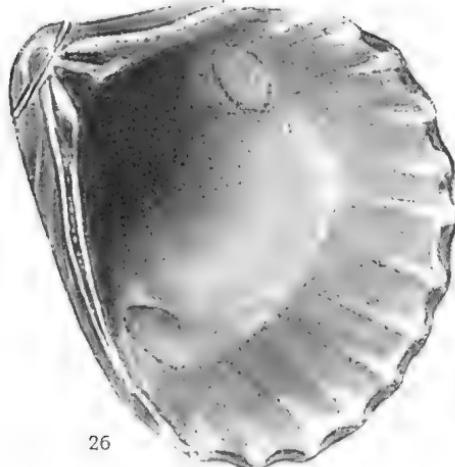
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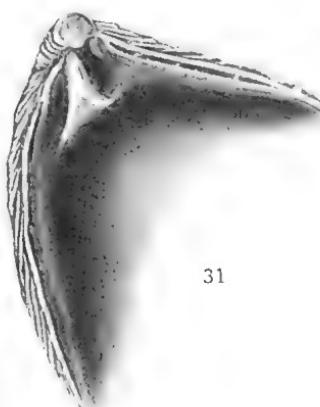
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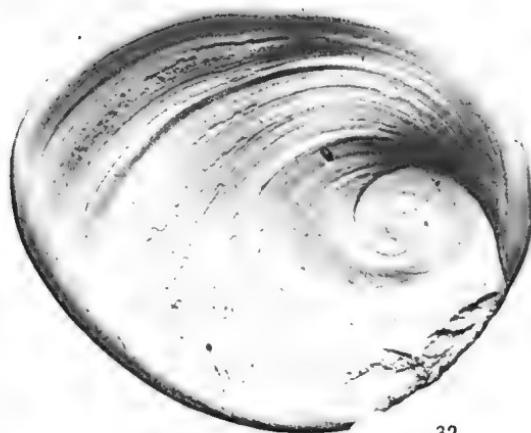


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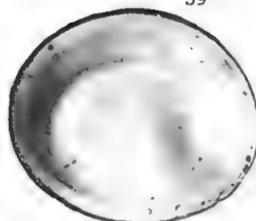
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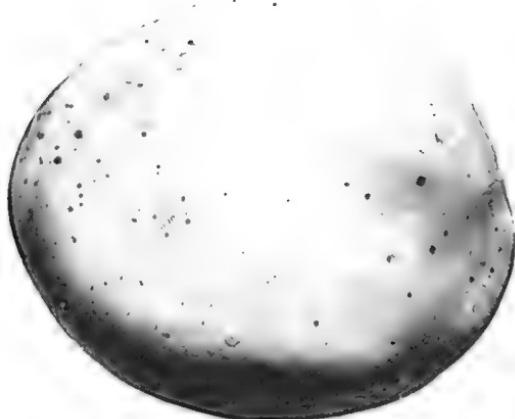
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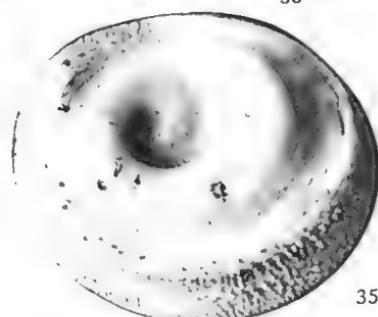
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[From "Transactions of the Royal Society of South Australia,"  
vol. xxxiii., 1909.]

**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART X.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S.

[Read June 1, 1909.]

PLATES XX. AND XXI.

**Cyclostrema (Daronia) jaffaensis, n. sp.**

Pl. xx., figs. 6 and 7.

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Shell small, concentrically coiled. Whorls two, convex, uniformly increasing. Suture distinct, impressed. Aperture reniform: only a thin glaze over the preceding whorl; borders simple, thin, at the sides concavely retrocurrent near the suture, then convexly antecurrent, and in front barely concave. Umbilicus very wide and perspective, showing all the whorls: the sunken spire is similar, but not quite so deep or steep. Both depressions are bounded by a minute angulation or carinating cord, which winds round the whorl, gradually approaching the suture until it is lost in the depression at the beginning of the penultimate whorl.

*Dim.*—Largest diameter, 2 mm.: smallest, 1·6 mm.; width of aperture, 1 mm.

*Locality.*—90 fathoms off Cape Jaffa, 2 good, dead.

*Obs.*—The genus is provisional. *Daronia* (A. Adams), a planorbiform section, corresponds, but for the continuity of its peristome.

**Xenophora tatei, Harris.**

*Xenophora (Tugurium) tatei*, Harris, Brit. Mus. Cat. Tert. Moll., Austr., vol. i., 1897, p. 254, pl. vii., figs. 7a and 7b.

Hedley, Memoirs Austr. Mus., "Thetis Results," 1903, p. 357. "A broken shell, 30 mm. in diameter, and apparently half-grown; corresponds with actual fossil shells from Muddy Creek, with which I have compared it."

Four were dredged dead in 15 to 20 fathoms in Petrel Bay, St. Francis Island; 17·5 mm. in diameter, exclusive of accretions. They were submitted to Mr. Hedley, who wrote:—"For the purpose of this note I have again scrutinized both a Muddy Creek fossil and the New South Wales series of recent shells, and I see no difference." By courtesy of Mr. Howchin I have compared it with the fossils in the Tate Museum of the University of Adelaide. These are much larger when full-grown, and show a comparatively larger umbilicus and much more valid and very regular radial liræ

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" Oct " 244-342

on the base. But fossils of the same size as the recent shell have quite similar weak, crinkled striations.

**Turbonilla brevis**, Pritchard and Gatliff. 2456

*Turbonilla brevis*, Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1900, vol. xiii. (New Series), pt. 1, p. 135, pl. xxi., fig. 4. Type locality—"Off Rhyll . . . about four fathoms."

Taken in Gulf St. Vincent, depth not recorded, many examples alive and dead.

*Gatliffena*

**Donovania fenestrata**, Tate and May. 247

Pl. xxi., figs. 8 and 9.

*Donovania fenestrata*, Tate and May, Trans. Roy. Soc., S. Austr., vol. xxiv., 1900, p. 94. Type locality—East coast of Tasmania (W. L. May); Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 372, pl. xxiv., fig. 36.

Dredged in 110 fathoms off Beachport, 10 examples; in 150 fathoms 1, and in 40 fathoms 1; in 130 fathoms off Cape Jaffa 2, all dead (Dr. Verco); MacDonnell Bay beach, 1 (Dr. Torr).

*Obs.*—The above specimens were identified by me from examples sent by Mr. May, and later by him from his type. I had already had the figures drawn as for a new species of Trophon. The spiral liræ may be three, four, or five in different shells. The colour may be wholly translucent glistening white; or wholly light-brown, with a white protoconch; or cream-coloured, faintly tinted brown over the base. The dimensions may be—Length, 12 mm.; width, 2·9 mm. Length of body-whorl, 3·7 mm., just half as large again as the type.

*Godfreyana* 230

**Cominella torri**, n. sp. Pl. xxi., figs. 10 and 11.

Shell large, solid, elongate-oval, of six whorls. Protoconch absent. Sutures distinct, broadly, flatly margined. Whorls convex, roundly shouldered above the middle. Body-whorl longer than the spire, base contracted. Aperture obliquely axially narrowly elliptical, with a moderate oblique sinistral open canal, somewhat recurved and notched; a narrow gutter at the suture, which slightly ascends. Outer lip simple, thin, rather effuse from its centre to the notch. Inner lip well marked, callous, smooth, and polished, complete from above the posterior gutter nearly to the notch, somewhat spreading, thickest about the columella: this is straight, obtusely roundly angled at its junction with the canal.

Sculpture: broad, round axial ribs, wider than the spaces, most prominent at the shoulder, not affecting the

sutural margin, nearly vanishing at the periphery of the body-whorl. Four spiral equidistant narrow cords on the spire whorls: seventeen on the body-whorl: the front six below the periphery being the largest. Interstices with four to seven slightly crinkled threadlets.

Inside the aperture, at the anterior end of the columella, just above the canal, are two spiral threads, very distinct in broken shells.

The colour in the spire, from the shoulder to the lower suture, is a beautiful pinkish-salmon tint, fading towards the summits of the costæ. On the body-whorl this colouration ceases abruptly at the periphery, with a spiral line of small deep-brown articulated spots, which similarly ornament all the cords on the base. Short, wavy axial reddish-brown lines and flames crowd along the margined suture; and axial zig-zag dark-brown lines, rather more numerous than the costæ, cross the broad band on the body-whorl.

*Dim.*—Length, 41 mm.; breadth, 19 mm.; length of body-whorl, 29 mm. Another specimen, if whole, would be 60 mm. long and 28 mm. broad.

*Locality*.—St. Francis Island, 16 dead shells and fragments. No living or perfect example was obtained. It must be a large and beautiful shell. The two columellar plaits suggest *Peristernia*, but I have placed it provisionally in *Cominella*.

### *Cyphorochelus* *Typhis bivaricatus* n. sp. Pl. xxi., figs. 1 and 2. 565

Shell imperforate, elongate-oval, rather thin; white, tinged with brown below the suture and the periphery. Whorls six, including a protoconch of nearly two smooth inflated turns. Spire-whorls, each bears four projecting tubes with a rounded aperture; between these are double varices, the more prominent leaf midway between the tubes, the other just behind a tube; each leaf is flexuous and tridentate, and ends behind in a hollow-pointed recurved spine. Body-whorl nearly as long as the spire, narrowed at the base, from which project the ends of three canals, towards each of which the two leaves of a varix converge to unite. Aperture roundly-oval, small, entire, peristome projecting, detached, simple, and sharp. Canal completely closed from the aperture to its end, wide, slightly oblique to the left, recurved. Tube long, round, curved.

*Dim.*—Length, 5·5 mm.; spire, 2·8 mm.; body-whorl, 2·7 mm.; tube, 2·1 mm.; breadth, 2·6 mm.

*Locality*.—20 examples dead in 104 fathoms, 35 miles south-west of Neptune Islands.

*Diagnosis.*—It differs from *T. gatesi*, Crosse, in being smaller, and in its double varices, which contain fewer and differently-shaped denticulations.

*Litozamia*  
*Trophon rudolphi*, Brazier. 566

*Peristernia rudolphi*, Brazier, Proc. Linn. Soc., New South Wales, vol. ix., series 2, 1894, p. 166, pl. xiv., fig. 1. *Type locality*—Port Jackson.

*Trophon rudolphi*, Brazier, Hedley, and May, Records of Austr. Mus., vol. vii., No. 2, 1908, p. 112, from 100 fathoms, Cape Pillar, Tasmania.

Dredged in 40 fathoms off Beachport, five good specimens.

*Litozamia*  
*Trophon simplex*, Hedley. 579

*Trophon simplex*, Hedley, Memoirs Australian Mus., vol. iv., pt. 6, 1903, p. 380, fig. 93. *Type locality*—Off Port Kembla, New South Wales, in 63 to 75 fathoms.

Dredged in 104 fathoms 35 miles south-west of Neptune Islands, thirteen examples; in 90 fathoms off Cape Jaffa, 20 examples. Identified by Mr. Hedley from his type.

*LITOZAMIA*  
*Trophon longior*, n. sp. Pl. xxi., figs. 5 and 6. 570

Shell solid, narrowly fusiform, of seven whorls. Protoconch of two and a half whorls, smoothly granular, ending by a distinct scar; first whorl with two carinae, of which the highest continues as a sharp-corded angulation through the embryonic whorls, the lower fades out on the first whorl. Sutures distinct, barely margined. Whorls convex. Aperture obliquely oval; canal nearly as long as the aperture, directed obliquely to the left, concave to the right, slightly recurved. Outer lip thin, simple. Inner lip thin, erect anteriorly. Columella concave, obtusely roundly angled at its junction with the canal. Sculpture bold; axial costæ eleven in the penultimate, rather wider than the interspaces, round, extending from the suture which they undulate to the canal, whose varix they scale; spirals, four in the penultimate, three in the earlier whorls, nine in the body-whorl, round, crossing the axials. Colour white, just tinted with brown; deeply scorched spirally on the axial costæ near the suture, and in the body-whorl just below the periphery.

*Dim.*—Length, 6·4 mm.; width, 2·7 mm.; aperture, 1·5 mm.

*Locality.*—Type in 40 fathoms off Beachport, with one other example, good, but dead.

*Diagnosis.*—It resembles *Trophon rudolphi*, Brazier (taken by me and kindly identified by Mr. C. Hedley), in its striking protoconch, but is longer and narrower, and

has its axials and spirals not so broad and close-set. It may be only a variant, in which case its specific name will indicate its difference from the typical form.

*ANATROPHON latior*, n. sp. Pl. xxi., figs. 3 and 4. 578

Shell solid, ovately fusiform, of seven whorls. Protoconch of two and a half whorls, smooth, convex, ending abruptly, apex exsert. Whorls convex, the first round, the others sharply angulate above the centre. Body-whorl roundly angled at the periphery, very contracted at the base. Aperture obliquely axially oval. Canal moderate, oblique to the left, slightly concave to the right, recurved, open. Outer lip thin, simple; inner lip only a glaze. Columella nearly straight, scarcely angled at junction with the canal. Sculpture bold; axial costæ, ten in the penultimate, high, compressed, rounded, narrower than the interspaces, extending from the suture to the varix of the canal. Spirals three, the largest on the shoulder, the smallest between it and the upper suture, crossing the costæ; nine in the body-whorl. Colour horn-tinted, with a white spiral line at the angle, and a broad, brown band below the periphery, dotting the spire whorls in the spaces above the suture and fading out anteriorly. The most anterior spiral on the varix of the canal articulated brown, the one above it wholly white.

Dim.—Length, 7·2 mm.; of body-whorl, 4·7 mm.; width, 3·9 mm.

*Locality*.—Type in 40 fathoms off Beachport, with two other fresh specimens, all dead.

*Obs.*—One example is not quite so wide as the type. Its affinity is with *T. columnarius*, Hedley and May, but is shorter and wider (whence its name) and has not its axial foliations.

*Voluta fulgetrum*

*Voluta fulgetrum*, Sowerby, var. *dictua*, var. nov. 692  
Pl. xxi., fig. 7.

*Voluta fulgetrum*, Sowerby, Catalogue of Shells in the Collection of the Earl of Tankerville, 1825; Appendix, p. 28, No. 2149, pls. iv. and v.

This variety is of the same shape and size as individuals with typical colouration. It is covered with a fine network of a light yellowish-brown tint, formed by close-set axial lines of small transverse arrowhead and reticulate markings, not unlike those of *Voluta exoptanda*, Sowerby. At the suture in the body-whorl these lines end as small blotches of deeper colour, producing a flamed articulation; and in

the spire-whorls, just above the suture, are distant, transverse, oblong spots, about six in a whorl.

Taken in lobster-pots off Granite Island, Port Victor, three examples.

**Philine columnaria**, Hedley and May. 888

*Philine columnaria*, Hedley and May. Records Austr. Mus., vol. vii., No. 2, 1908, p. 123, pl. xxiv., figs. 25, 26. *Type locality*—100 fathoms, off Cape Pillar, Tasmania.

Dredged dead, in poor condition off Beachport in 40 fathoms, 1; in 100 fathoms, 2; in 110 fathoms, 5; in 200 fathoms, 6; off Cape Jaffa in 130 fathoms, 3. It was identified by Mr. Hedley from type.

Some specimens show two spiral bands, one about the middle of the shell, the other about halfway between this and the apex, less opaque than the rest of the shell, and are sometimes constricted along these lines and swollen between. Mr. Hedley says the Cape Pillar individuals showed the same variation.

**Philine beachportensis**, n. sp. Pl. xx., figs. 1, 2, and 3. 890

Shell milk-white, ovate. Apex sunken. Vertex with a triangular callus projecting from the inner lip: from the apex of the callus a lamina borders the back of the aperture, and a second runs round the middle of the apical pit to the outer lip, the two enclosing a gutter narrowing outwardly.

Aperture wide in front, narrow behind, with a narrow posterior sinus. Outer lip simple, thin, straightly-convex in profile; basal lip uniformly curved; columella concave; inner lip with a defined, well-spread glaze, ending behind in the callus.

*Sculpture*.—Crowded, flat, spiral liræ, separated by incisions, widest in the central half, more crowded towards the base, most crowded in the posterior fourth. Very crowded, fine accremental striæ cross the spirals and distinctly punctate the incisions.

*Dim.*—Length, 18·2 mm.; breadth, 8·1 mm.

*Locality*.—Type in 200 fathoms off Beachport, with 8 smaller; 130 fathoms off Cape Jaffa, 16; 300 fathoms, 5, all dead.

**Philine evoluta**, n. sp. Pl. xx., figs. 8 and 9. 889

Shell small, thin, milky-white, short, subquadrate. Vertex very little narrowed, not umbilicated, showing three-quarters of a whorl. Surface flatly convex.

Aperture very wide, widely sinused above. Outer lip

thin, produced in a roundly-angular lobe above the vertex. Columella deeply and uniformly concave. Inner lip a moderately wide glaze. A minute rimate umbilicus.

*Sculpture*.—Numerous, flat, low spiral liræ, about one-third the width of their interspaces: at the vertex obsolete, in the middle more crowded. Subdistant accremental striæ and undulations.

*Dim*.—Length, 4·3 mm.: breadth, 3·5 mm.

*Locality*.—In 130 fathoms off Cape Jaffa, 1 dead.

*Aglaja Troubridgensis*, n. sp. Pl. xx., figs. 4 and 5. 392

Shell about two and a half whorls, detached; depressed conic; apex somewhat lower than the rest; inner margin not uniformly curved, thick, opaque white to an irregular depth varying from 2 to 4 mm.: outer part thin, translucent, with a membranous edge: surface irregularly corrugated by obliquely retrocurrent folds, which roughen the inner margin. Internally somewhat rugose.

*Dim*.—Greatest diameter, 21 mm.; smallest, 15 mm.; height, 21 mm.

*Locality*.—Troubridge Island, among the rocks. Animals collected by Miss Fraser. Shells only preserved.

*Obs*.—Whether an *Aglaja* or a *Navanax*, an examination of the animal will decide. I have adopted Renier's generic name instead of the *Doridium* of Meckel, following Tryon.

OCT 1909

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vol. xxxiii., 1909.]

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA.  
WITH DESCRIPTIONS OF NEW SPECIES.—PART XI.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 5, 1909.]

PLATES XXII., XXIII., AND PART XXVI.

My paper deals with the genus *Triphora*. I have adopted this name, in accordance with the conclusion arrived at by Mr. Hedley as to Blainville's priority of publication.

Hitherto only four species have been recorded for South Australia, which furnished the type specimens of them all—viz., *T. angasi*, *T. festiva*, *T. pfeifferi*, all of Crosse and Fischer, and *T. scitula*, A. Adams. Several others were known to occur here, but their identification was difficult. Mr. Hedley, in a valuable contribution to the Proc. Linn. Soc. of New South Wales, 1903 (1902), on the Triphoridae of that State, cleared away much of the obscurity which had enveloped some already described species from Port Jackson, and added several new ones to the list. Specimens of nearly all these, kindly supplied by him, have aided considerably in unravelling the tangle of our South Australian forms. Six of his eight novelties are represented here, and four of the six species described by other authors. The task has been difficult, even with this clearance. A very large number of shells, collected during several years' dredging, furnished not only many species, but a most perplexing number and series of variants in nearly every species; and what with macromorphs and micromorphs, juveniles and adults, narrow and obese forms, differences in relative size of pearl rows, validity and invalidity of the sutural thread, rolled, bleached, or fresh shells, typical and atypical colouration, accurate specific determination at times seemed unattainable. Even now it is impossible absolutely to decide whether some of my enumerated varieties are not distinct species, and some of my newly-named species may not prove eventually to be only variants. Of the four species enumerated in Adcock's "Handlist of Aquatic Mollusca of South Australia," 1893, one has been omitted, viz., *T. scitulus*, A. Adams. It was described from a Port Lincoln shell, but has not been recognized. A shell which in some respects conforms to the description has been dredged, but I refrain at present from so naming it. To the remaining three species we have been

able to add nine more from other authors, and ten new forms now described, bringing the total to 22 species, with 4 varieties. Two dextral shells are very interesting, as are also three subulate species, all from comparatively deep water.

*Triphora dexia*, n. sp. Pl. xxii., figs. 6 to 10. *341x*

Shell dextral, elongate conical in the earlier half, cylindrical in the later; of 15 whorls, including the protoconch. This has two and a half turns, its whorls short and swollen convex, with axial costæ, valid; 12 in the first whorl, 17 in the second; the apex is a tiny smooth hemisphere lying horizontally. Spire-whorls not convex, suture distinct, impressed. The body-whorl has three openings—one a bent tube formed by the closure of the anterior canal; the second a bent tube formed by the closure of the posterior canal, and projecting just below the suture; the third by the aperture which is complete, round, much produced into a wide tube, somewhat effuse at its opening, and with a slightly irregular border.

*Sculpture*.—In the upper whorls is a central prominent round rather rugged spiral rib, a second smaller spiral lies immediately below the suture, and a third is just visible immediately above the suture. As the shell grows the lowest rib gradually enlarges until in the last whorl it equals the central rib. This rib, at first central, gradually moves lower and approximates the third rib. Axial ribs, 16 in the penultimate, one-fourth the thickness of their interspaces and somewhat obliquely antecurrent, extend between the sutures, validly tuberculating the central spiral and but slightly the sutural ones. A scar runs from a slight notch near the centre of the ventral border of the apertural opening to the extremity of the anterior tube, and another from near the centre of the dorsal border of the aperture to the end of the posterior tube, indicating the lines along which union between the two sides of the aperture has been effected. The base is flatly concave with the anterior tube projecting in its centre, is radially engraved with curved lines, and is surrounded by a nodular pad formed by the exaggerated lowest spiral, which with its fellow then runs between the two closed canals, and fades out on the dorsum of the apertural tube. The upper spiral vanishes at the base of the posterior tube.

*Dim.*—Length, 7·5 mm., including the anterior tube of 0·7 mm.; width, 1·6 mm., excluding the apertural tube of 0·6 mm. Diameter of apertural tube, 1·1 mm., including its reflected expansion.

*Variations*.—The adult mouth may form in a shell with

only 11 whorls and 4·3 mm. long, or in 1 with 17 whorls and 7·9 mm. long.

*Locality*.—Type from 55 fathoms off Cape Borda, with 56 others in good condition and about 90 poor; also in 62 fathoms, 2 poor: also off Beachport in 40 fathoms, 2 good; in 110 fathoms, 4 good and 5 moderate; in 300 fathoms, 3 poor: off Cape Jaffa in 130 fathoms, 2 moderate; in 300 fathoms, 1 poor. Its habitat would therefore appear to be in 50 fathoms, extending up to 40 and down to 110.

*Obs.*.—Although this shell is dextral it has been placed in the genus *Triphora*, because it has the three apertures in its body-whorl. But for this it would have been called a *Cerithiopsis*, and if immature it would have been placed in this genus. In the Bull. Mus. Compar. Zool. of Harvard Coll., vol. xviii., "Blake" Dredging, xxix., Report on the Mollusca, 1889, part 2, p. 242, W. H. Dall writes:—"There are probably," in *Triforis*, "some dextral forms, though such are apt to be referred to *Cerithiopsis*." This suggestion is the justification for calling my new species a *Triphora*. Subsequent examination of the animal may settle its final generic location.

### *EU* ***Triphora epallaxa*, n. sp.** Pl. xxii., fig. 1. 345

Shell dextral, elongate-conical in the earlier half, cylindrical in the later. Protoconch absent. Suture indistinct, minutely appressed. Whorls 18, flat, with two spiral rows of tubercles, axially alternating, much larger in the lower row: with a faint spiral cord joining the tubercles. The last whorl has its aperture round, projecting as a free tube, with a thin expanded border, also two other tubes—one standing out from the centre of the base, the other immediately below the suture of the penultimate whorl. The base is flatly convex and is slightly margined by the lower row of tubercles, which then passes between the two tubes and fades out on the dorsum of the projecting trumpet-shaped apertural tube. The upper row of tubercles ends at the base of posterior tube.

*Dim.*.—Length, 7·9 mm.; width, 1·7 mm.; including the projecting aperture, 2 mm.

*Locality*.—130 fathoms off Cape Jaffa, 2 dead.

*Diagnosis*.—It resembles *T. dextrit* in being dextral, in its general shape, and in having three well-formed tubes, but is plainly distinguished by the two rows of alternating tubercles.

### ***Triphora subula*, n. sp.** Pl. xxiii., figs. 5 and 6.

Shell sinistral, elongate-subulate-pyramidal. Protoconch of  $3\frac{1}{2}$  turns; the first has two high, narrow, smooth, rounded

keels joining at the apex to form a tongue : the second whorl shows the beginning of a third keel, infrasutural, and distinctly smaller : the interspaces are concave and microscopically axially striate. Spire-whorls 20, with three spiral ribs ; one immediately beneath the suture is the narrowest, flat on its posterior surface and nearer the middle one than is the lowest ; about one-half the width of the interspaces : nodular, especially the central rib ; nodules transversely elongate, fully twice as long as broad, joined in the interspaces by oblique, low, very broad, rounded axial costæ, much wider than their interspaces : faint microscopic acermental striae. The last 6 whorls have a supra-sutural smooth thin ledge. Aperture broken. Colour uniformly light-horn tint ; the posterior spiral distinctly darker.

*Dim.*—Length, 12 mm. (probably 14 when perfect) ; breadth, 1·6 mm.

*Locality.*—Type Gulf St. Vincent, depth unrecorded, with 2 other examples : in 55 fathoms off Cape Borda, 1 dead.

One of the co-types shows two smooth spirals on the base, a nearly oblong mouth, and an anterior canal, curved to the left, reflected and notched.

***Triphora spina*, n. sp. Pl. xxii., figs. 2, 3, and 4.**

Shell sinistral, elongate-subulate-pyramidal. Protoconch of 4 turns, apex prominent and tongue-like, whorls smooth, centrally boldly angled, concave between the median angulations. Suture linear. Spire-whorls 17, with four ribs ; the largest is the continuation of the nuclear angulation : above this is a much smaller infra-sutural rib, below it the shell wall seems thinner and less opaque ; then comes a bold rib, and close below it a supra-sutural rib. They are slightly tuberculate with low transverse nodules, united by low broad oblique axial costæ, most marked between the upper two ribs, but connecting the upper three : the supra-marginal rib is smooth, and wedged in between the two adjacent ribs. Aperture roundly rhomboidal ; outer lip crenulated by the spirals, antecurrent into a spur towards the front ; canal nearly closed at this point, curved to the left, and reflected ; back of the aperture pinched at the suture, but no sutural notch. Base smooth, with one spiral. Colour, light-amber tint.

*Dim.*—Length, 12·4 mm. ; width, 1·9 mm.

*Locality.*—Type, 110 fathoms off Beachport, with 2 others perfect and 11 broken, in 150 fathoms 6 moderate, and in 200 fathoms 3 poor ; in 90 fathoms off Cape Jaffa, 7 perfect and 14 broken, and in 130 fathoms 3 broken.

It differs from *T. subula* in its unicarinate protoconch, and in having the 4 ribs throughout.

*TERET* **Triphora spica**, n. sp. . Pl. xxiii., fig. 1. 370

Shell solid, long, narrow, upper third elongate-conical, the rest nearly cylindrical. Protoconch of 5 whorls, convex, with two central closely approximate spiral threads and numerous axial bars. Spire-whorls 17, the first three with two nodulate spiral ribs, and an infra-sutural small, smooth cord. In the fourth whorl this becomes nodulate; and getting thicker equals the other spirals in the sixth whorl. Between the twelfth and thirteenth whorls a supra-sutural thin threadlet appears and gradually enlarges and grows subnodular. The nodules in a spiral row on the penultimate are 17, transversely elliptical, and are joined spirally by a bar about one-third of their width, and vertically by obsolete bars nearly their own width. The body-whorl has three spiral ribs, a subnodulated peripheral riblet, a distinct smooth, stout, basal spiral, and an obsolete one at the base of the canal. The lip is broken. Colour, light-brown, with axial streaks of darker-brown from suture to suture: sometimes these happen to be continuous over two or more whorls, sometimes not: the protoconch is of darker brown.

*Dim.*—Length, 9·7 mm.; breadth, 1·55 mm.; length of protoconch, 55 mm.

*Locality*.—Type, 40 fathoms off Beachport, with 4 others; 55 fathoms off Cape Borda, 10 good, many poor; 62 fathoms off Cape Borda, 1 poor; Gulf St. Vincent, under 25 fathoms, 7 poor. The habitat would appear to be in 40 to 50 fathoms.

*Diagnosis*.—From *T. kestereni*, Hedley, it differs in its nodulated spirals and in its colour.

*TERET* **Triphora angasi**, Crosse and Fischer. 367

*Triphoris angasi*, Crosse and Fischer, Jour. de Conch., 1865, p. 46, pl. i., figs. 12 and 13. *Type locality*—Gulf St. Vincent, South Australia. Hutton, 1880, Manual New Zealand Moll., 1880, p. 75, Stewart Island, 30 fathoms.

*Triforis*, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 388, Tasmania (Miss Lodder); Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902, vol. xiv. (N.S.), part 2, p. 86, Victorian coast.

*Triphora*, Hedley, Proc. Linn. Soc., New South Wales, 1902, vol. xxviii., p. 610, Sydney Harbour.

Taken on the beach at Yankalilla, Gulf St. Vincent, Scales Bay, and St. Francis Island in the Great Australian

Eight. Dredged in 6 fathoms, and in 15 fathoms off St. Francis Island in poor condition; in 20 fathoms, Gulf St. Vincent and Investigator Strait, few, mostly dead; in 25 fathoms, Spencer Gulf, 1 moderate; in 40 fathoms off Beachport, 7 perfect and 19 good; in 55 fathoms, Cape Borda, 7 moderate; in 62 fathoms off Cape Borda, 1 poor; in 110 fathoms off Beachport, 2 good, but somewhat decolourized. It is not a common shell in our waters or on our beaches. Angas, in Proc. Zool. Soc., Lond., 1865, p. 172, gave its station as "deep water," Gulf St. Vincent. This would mean something less than 25 fathoms. It is found perfect as deep as 40 fathoms and moderately good up to 55 fathoms, but beyond that poor.

Hedley says, *loc. cit.* :—"No specimens examined afforded an opportunity for describing the protoconch." I may add, therefore, that it is elongate and pointed of  $4\frac{1}{2}$  whorls, which are convex, and have near their middle two carinae, very close together, the lower of which enlarges and forms the lower of the two pearl rows in the first spire-whorl: the upper carina rather later deflects rather abruptly upwards and forms the upper row. The protoconch is axially closely lirate. The shell when adult may vary from 8·1 mm. to 4·1, and may when of equal length vary distinctly in obesity, and also in the roundness of the lower part of the body-whorl.

TERETRIFORA angasi, Crosse and Fischer, var. leuca, n. var.

This shell is usually longer and narrower than the average typical shell, is less rounded in the body-whorl, and has the sutural furrow rather more distinct, but in all these respects both the type and the variety vary. It is not a dead and bleached shell, but is taken quite white in a perfectly fresh condition. But some few specimens are uniformly very faintly brown, some have only the base slightly brown, some are just tinted brown over a greater or smaller vertical extent of the spire, or over the centre of the whorl for one or two turns, proving it probably only a variety.

It is taken perfect on the beach at St. Francis Island and Seales Bay on the West Coast: in 6, 15 to 20, and 35 fathoms off St. Francis Island, 14 fathoms off Ardrossan, 20 fathoms Investigator Strait, 45 fathoms off the Neptunes, 55 fathoms off Cape Borda, 40 and 110 fathoms off Cape Borda; while in poor condition it is found in 130 fathoms off Cape Jaffa, and in 150 fathoms off Beachport. My dredgings have yielded more good specimens of this variety, and to a greater depth, than of the typical *M. angasi*, Crs. and Fischer.

*Votosinister* **Triphora innotabilis**, Hedley. 352

*Triphora innotabilis*, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), part 4, p. 608, pl. xxxii., figs. 23, 24, 25.  
Type locality—Sydney Harbour.

Dredged in Gulf St. Vincent, (?) depth, 10 good, 4 moderate; in 22 fathoms, Investigator Strait, 2 perfect and fresh; in 62 fathoms off Cape Borda, 1 perfect. Taken in shell sand, Edithburgh and at Streaky Bay, good. Identified by Mr. Hedley from his type.

*Votosinista* **Triphora latilirata**, n. sp. Pl. xxvi., fig. 1. 364

Shell sinistral, solid, elongate-conic. Protoconch of 5 whorls, smooth and round. Spire-whorls 13, flat, sloping; suture rather wider than the spaces between the spiral ribs. Spirals 3, flat, wide, nearly smooth on the surface; interstices narrow, punctated by close-set axial incisions, which also cut the sides of the lira. Body-whorl rhomboidal, with three spiral ribs, towards the aperture the interspaces are occupied each by a short, rapidly-widening spiral; the axial incisions are more distinct towards the aperture. Base convex with a peripheral spiral, rounded, smooth keel, and a second more anterior, punctated between. Aperture roundly quadrate; outer lip sloping, straight, ascending at the suture and pinched into a tiny sinus, anteriorly circular and effuse; in profile straight, minutely retrocurrent at the suture, obliquely very slightly antecurrent anteriorly. Canal well marked, nearly closed, especially at the junction with the aperture, markedly recurved. Inner lip distinct, slightly erect. Colour, white.

Dim.—Length, 10.5 mm.; breadth, 2.5 mm.

Locality.—Type, Gulf St. Vincent, (?) depth, with 23 others moderate; in 15 to 20 fathoms off St. Francis Island, 1 moderate; in 24 fathoms off Newland Head, 1 moderate; in 55 fathoms off Cape Borda, 1 good.

Variations.—In the shell from 55 fathoms, in the antepenultimate whorl an interstitial thread arises between the middle and anterior spirals, and becomes a definite though small lira. In some large shells a thin sutural lamina is seen between the later whorls. A large broken specimen would measure 15 mm. if complete. In one individual the posterior spiral lira throughout the shell is tinged brown.

*Votosinista* **Triphora armillata**, n. sp. Pl. xxii., fig. 5. 345 *Voco 1909*

Shell solid, elongate-conic. Protoconch of 4 whorls, convex, centrally carinate, the fourth with two approximate carinae; crowded fine axial bars, concave forward above the

carinæ, straight below. Spire-whorls twelve, sloping, the first four with two spiral rows of pearls; in the fifth a lira appears between them, and becomes gradually as large as the others; the tubercles are large, about twenty in a row in the penultimate, joined by short bars transversely, and by narrower axial bars directed obliquely forwards towards the lower suture. Sutural spaces distinct, as wide as a pearl row; in the eighth a supra-sutural thread arises, which grows distinct and slightly tuberculate. Base flatly convex, with the sutural lira, and two basal liræ; the first with valid transversely oval tubercles, joined by very broad axial bands to much lower tubercles in the second, and by vanishing bands to the nearly smooth third lira. Aperture round, pinched at the suture into a sinus, and with a short well recurved canal in front; outer lip thin, simple, slightly reflected at its margin, retrocurrent at the suture, crossing the columella in front and flattened out over the base of the canal, so as to close it here. The outer lip has eight nodulous spirals on its outer surface, *viz.*, three as on the spire, the peripheral and one basal, and three others intercalated on the body-whorl. Colour, protoconch light-brown, shell white, but for the fifth and sixth whorls which are dark-brown, so as to form a sort of bracelet, whence the name.

*Dim.*—Length, 7·9 mm.; breadth, 2·2 mm.

*Locality*.—Type, Gulf St. Vincent, dredged in 20 fathoms, with many other good ones; also in 6 and in 15 to 20 fathoms off St. Francis Island, 9 good in each; in 22 fathoms, Investigator Strait, 2 good and 4 poor; in 22 fathoms, outside Backstairs Passage, 3 poor; in 40 fathoms off Beachport, 2 moderate, 3 poor; in 55 fathoms off Cape Borda, 4 poor. Also taken on the beach in Gulf St. Vincent, Venus and Seales Bay, West Coast, and many and good on St. Francis Island. It is a shallow-water species, ranging up to about 40 fathoms.

*TÉRÉ* **Triphora cinerea**, Hedley.

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*Triphora cinerea*, Hedley, Proc. Linn. Soc., New South Wales 1903 (1902), part 4, p. 612, pl. xxxiii., figs. 36 and 37. *Type locality*—Middle Harbour, Port Jackson. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906 (1905), vol. xviii. (N.S.), part 2, p. 61, Victoria.

Dredged in 14 fathoms off Ardrossan, 3 moderate; in Gulf St. Vincent, below 25 fathoms, 12 fresh, 32 moderate, 18 poor; in 40 fathoms off Beachport, 9 perfect, 22 moderate; in 55 fathoms off Cape Borda, 9 good, 7 poor; in 62 fathoms, 1 moderate; in 90 fathoms off Cape Jaffa, 16 moderate, immature, and 9 poor, broken; in 110 fathoms off Beachport, 3 moderate, broken; in 130 fathoms off Cape Jaffa, 1

poor, broken; in 300 fathoms, 5 fragments; and in 300 fathoms off Beachport, 1 poor. Taken on the beach at St. Francis Island, 5 moderate.

*Obs.*—This species flourishes in the medium depths, being not littoral, up to 50 fathoms, and then gets rare and poor. One taken in Gulf St. Vincent is quite white, as is one from Cowes, Victoria.

*Cautor* *Triphora-regina*, Hedley. 364

*Triphora regina*, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), part 4, p. 608, pl. xxxii., fig. 21. *Type locality*—Balmoral Beach, Port Jackson.

Hedley's unique type was "mutilated at each extremity," so I complete the description from a perfect specimen. It has a brown, elongate five-whorled protoconch, whorls convex, faintly unicarinate in their anterior third and axially finely lirate. The aperture is circular, with a rather deep, narrow posterior sinus. The inner lip is erect and solid, meeting the edge of the basal lip, which does not cross it. Canal nearly closed, reflected, notched. It appears to be a good species.

Dredged in Gulf St. Vincent, (?) depth, 1 poor; in 35 fathoms off St. Francis Island, 4 poor; in 40 fathoms off Beachport, 1 perfect, 3 good; in 45 fathoms east of North Neptunes, 1 poor; in 55 fathoms off Cape Borda, 2 moderate; in 62 fathoms north-west of Cape Borda, 1 poor; in 90 fathoms off Cape Jaffa, 1 perfect; in 110 fathoms off Beachport, 1 good; in 130 fathoms off Cape Jaffa, 4 moderate; in 150 fathoms off Beachport, 4 moderate. Taken on the beach at St. Francis Island, 6 moderate. This seems to be a deep-water form.

*Triphora albovittata*, Hedley.

*Triphora albovittata*, Hedley, Proc. Linn. Soc., New South Wales, 1902, part 4, p. 609, pl. xxxii., figs. 26, 27. *Type locality*—Balmoral Beach, Port Jackson.

Dredged Gulf St. Vincent, depth unrecorded, 1 perfect; in 35 fathoms, St. Francis Island, 1 poor; in 40 fathoms off Beachport, 1 good; in 55 fathoms off Cape Borda, 1 very good; in 90 fathoms off Cape Jaffa, 2 good. Taken at St. Francis Island on the beach, 3 perfect, 2 good.

*Nosinister* var. *mamillata*, var. nov. 353

Instead of having the elongate four-whorled protoconch of the type, it has a mamillary two-whorled apex. The first whorl is round and smooth, the second has a central carina

and subdistant axial bars. Generally the second is swollen and lies somewhat out of the axis of the shell, causing the mamillate form. Rarely the first whorl may be as large as the second. This protoconch seems complete, and not the base of a spiculate protoconch, whose terminal whorls have fallen. The shell varies in shape, being short, broad, and pupæform, or long, narrow, and elongate-pyramidal.

Dredged in Gulf St. Vincent, 7 perfect and 7 poor; in 90 fathoms off Cape Jaffa, 2 good; in 150 fathoms off Beachport, 2 poor. Taken on the beach MacDonnell Bay, 1; Gulf St. Vincent, 23, in varying condition; Venus Bay, 2, good.

The very different protoconch makes me diffident about calling this a variety, inasmuch as the characters of the protoconch are generally regarded as very certain specific diagnostics: but the shells are otherwise indistinguishable.

### *Nodosinista* *Triphora granifera*, Brazier. 357

*Triforis graniferus*, Brazier, Proc. Linn. Soc., New South Wales, 1894, vol. ix., 2nd ser., p. 173, pl. xiv., fig. 10, Port Jackson.

*Triphora granifera*, Brazier, Hedley, *op. cit.*, 1903 (1902), p. 610, pl. xxxii., figs. 28 and 29; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906 (1905), vol. xviii. (N.S.), p. 60, Western Port.

Taken on the beach from MacDonnell Bay to Scales Bay, and St. Francis Island. Dredged in 6, 14, 20, 22 fathoms in Gulf St. Vincent and off St. Francis Island, alive; in 35 fathoms off St. Francis Island, 3 poor; in 40 fathoms off Beachport, 4 good, 11 poor; in 62 fathoms off Cape Borda, 3 poor; in 110 fathoms off Beachport, 2 moderate; in 130 fathoms off Cape Jaffa, 1 moderate; in 300 fathoms off Beachport, 1 good and 1 moderate. This appears to be a littoral form, extending up to 22 fathoms: beyond that depth the shells are mostly dead and decolourized.

The length of the type is 4 mm., but it may be 5·7 mm. or 2·9 mm. Sometimes the shell has the lowest pearl row the largest, and the highest the smallest, so that the whorls are imbricating or pagoda-like. Sometimes the supra-sutural threadlet stands out as a distinct low, small pearl row. One adult micromorph has the lowest pearl row relatively very large, so as to suggest *T. pfeifferi*, Crosse, but the short, thick figure is that of *granifera*. The South Australian shells are very rarely wholly dark- or light-brown like the Sydney specimens, but are a glistening, translucent white, with brown, squarish blotches. These may be quite dark or very pale, large or small, few or many, so as to make the shell nearly white or nearly brown.

~~Triphora pfeifferi~~ *Triphora pfeifferi*, Crosse and Fischer, 37

*Triphora pfeifferi*, Crosse and Fischer, Jour. de Conch., 1865, p. 47, pl. i., figs. 14 and 15. *Type locality*—Gulf St. Vincent.

*Triforis pfeifferi*, Crosse and Fischer, Tryon, Man. of Conch., vol. ix., 1887, p. 182, pl. xxxviii., fig. 9; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 388. Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, vol. xiv. (N.S.), 1902, p. 86, Victoria.

Taken on the beach as far west as Venus and Seales Bays, and on St. Francis Island. Dredged at 6, 15, 20, 22 fathoms, alive, in Gulf St. Vincent, etc.: in 40 fathoms off Beachport, very many good; in 55 and 62 fathoms off Cape Borda, 2 perfect, 2 fresh, 5 good; in 90 fathoms off Cape Jaffa, 1 perfect, 3 poor; in 110 fathoms off Beachport, 8, all broken; in 130 fathoms off Cape Jaffa, 2 good: in 150 fathoms off Beachport, 4 poor. It is very abundant on the beach and is manifestly a littoral shell, and certainly lives up to 22 fathoms, and may live up to 90 or 100.

The authors say "the first three whorls are smooth." The protoconch is of four convex whorls, with a central carina and crowded axial liræ, and a well-marked suture. The length of an adult shell with ascending suture and completely formed mouth may be 9·5 mm. or 3·7 mm.

It varies very greatly. When the supra-sutural ledge is wide, but not projecting, the middle row of pearls is larger than usual, and the upper row smaller than usual, an imbricating or pagoda-like shape is assumed. When the supra-sutural ledge is well marked and nodulated, so as to look like a pearl row, and the highest pearl row is small, and the middle row is scarcely seen, and the lowest is very large, this may appear to be a large central row between two smaller rows, and may, as Hedley suggests (Proc. Linn. Soc., New South Wales, 1903 (1902), p. 616), be *T. scitulus*, A. Adams, which we have not been able to identify among South Australian shells. Sometimes the shell is typically nacreous-white, with the violet-brown base, and the supra-sutural ledge articulated brown and white; but it may be almost throughout of a dark-violet-brown or any intermediate tint.

The mouth in Crosse's type appears not to have been complete. The outer lip ascends beyond the supra-sutural ledge so as to touch the lowest pearl row. Here it is pinched so as to form a gutter, and retires to form a notch. It is antecurrent towards the base and somewhat effuse, and crosses the base of the canal as a spur, so as to meet an erect rather thick inner lip.

*Vigilis. ista* ***Triphora festiva*, A. Adams.** 354

*Triphoris festivus*, A. Adams, Proc. Zool. Soc., London, 1851, p. 278. *Type locality*—Port Lincoln (Mus. Cuming). Angas, Proc. Zool. Soc., London, 1865, p. 172.

*Triforis festiva*, A. Adams, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 387, Tasmania.

Dredged in 40 fathoms off Beachport, 1 good, albino; in 6 fathoms off St. Francis Island, 3 poor. This is a littoral form. Taken on the beach Yankalilla, Gulf St. Vincent, Spencer Gulf, many good; and at Scales and Smoky Bays, and St. Francis Island in the Australian Bight, a few good.

The type was probably an immature shell, which would have a flat base; when mature the species has a rounded base with two simple spirals, besides the supra-sutural peripheral band. It has a four-whorled, brown, acutely-conical protoconch, the first turn of which is smooth, the others unicarinate with axial bars. The shell when apex and base are perfect may be 3·5 mm. long and 1·3 mm. broad, or 6·4 mm. long and 2·1 mm. broad. In the larger forms a threadlet arises in the later whorls between the two spiral pearl rows and becomes a third smaller row.

*Cavator* ***Triphora-ampulla*, Hedley.** 363

*Triphora ampulla*, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), p. 615, pl. xxxii., figs. 38 and 39. *Type locality*—Watson's Bay, Port Jackson. Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (N.S.), part 1, p. 378, Port Phillip.

Dredged in Gulf St. Vincent, 11 poor; 14 fathoms, Ardrossan, 1 good; 55 fathoms, Cape Borda, 3 poor; 90 fathoms, Cape Jaffa, 2 perfect; 110 fathoms, Beachport, 2 poor. Taken on St. Francis Island beach, 2 poor.

This seems to be a deeper-water form than *T. festiva*. The protoconch may be brown instead of white as in the type.

*Cavator* ***Triphora maculosa*, Hedley.** 361

*Triphora maculosa*, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), part 4, p. 614, pl. xxxii., figs. 32 and 33. *Type locality*—Middle Harbour, Port Jackson. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906 (1905), vol. xviii. (N.S.), p. 61, Victoria.

Dredged in 9 fathoms off Edithburgh, 3 good; in Gulf St. Vincent, depth unrecorded, 14 good; in 55 fathoms off Cape Borda, 1 poor; in 110 fathoms off Beachport, 1 poor. Taken on St. Francis Island beach, 22 good.

Mr. Hedley gives the length of his type as 6·7 mm., but some of my specimens reach 9·2 mm.

*Eu* **Triphora cana**, n. sp. Pl. xxiii., figs. 2, 3, and 4. 343

Shell sinistral, solid, of 12 whorls, elongate-conical. Protoconch slightly mamillate, of two whorls; the second the larger, convex, with sigmoid axial bars, 16 in a whorl. Spire-whorls, the first with one nodulous carina, the second with two, the third with three, the last arising between the other two. Whorls sloping, the last three subconvex. Sutural space distinct, with a supra-sutural thread in the last six spaces, remaining nearly smooth. Tubercles close, about 18 in the penultimate, joined transversely and axially (obliquely forwards) by stout bars which lattice the surface. Aperture roundly rhomboidal, scarcely pinched behind. Outer lip slightly retrocurrent towards the suture; basal lip in contact with the erect, solid inner lip, and crossing the columella, where it closes in the short recurved notched, otherwise open canal. Base flatly convex, bounded by the nearly smooth peripheral lira, with a second smooth basal lira and a third encircling the base of the canal. The protoconch and first four spire-whorls are white, the rest light-brown.

*Dim.*—Length, 7·1 mm.; breadth, 2·1 mm.

*Locality.*—Type, Gulf St. Vincent, depth unrecorded, with 15 good and 34 moderate examples; 35 fathoms, St. Francis Island, 1 good; 40 fathoms off Beachport, 1 good and 1 poor; 55 fathoms off Cape Borda, 3 good and 5 poor; 62 fathoms off Cape Borda, 1 moderate and 3 poor; 110 fathoms off Beachport, 2 moderate; St. Francis Island beach, 5 good, 1 poor.

The species varies a great deal—

1. In colour. The first six whorls may be white, and all the rest a blackish-brown. The first three whorls (including the protoconch) may be dark-brown, and all the rest light-brown, with no white whorls. The three apical whorls may be brown, the next three white, and the rest brown, so connecting the previous shell with the type. The three apical whorls may be brown, and the seven remaining whorls quite white. The infra-sutural pearl row in the coloured portion may be dark-purple or barely tinted, the others brown, or the highest and lowest row may be purple and the central brown.

2. In shape. In most examples, though not in the type, the posterior pearl row becomes larger than the others, the pearls being greater, and consequently closer, and are somewhat axially elongate. When this is marked the whorl may be wider below the suture than above it, so as to give a more or less gradate appearance to the whorls.

*TERE* *Triphora gemmegens*, n. sp. Pl. xxiii., figs. 7 and 8. 366

Shell sinistral, solid, of 12 whorls. Protoconch of three whorls, slightly deviated from the axis, swollen convex, ending abruptly, with three carinæ and obsolete axial liræ. Spire-whorls eight, subconvex, with three spiral ribs. Sutural spaces well marked, with a distinct supra-sutural thread. Base flatly convex, bordered by the supra-sutural lira, and with two broad, low, smooth spirals. Aperture roundly rhomboidal, pinched at the suture into a sinus, broken in front; inner lip erect and thick along the straight columella, outer lip ascending at the suture. Sculpture: the upper two spirals are closer than the lower, sigmoid transversely, wider than the interspaces, not gemmed (whence the name), but roughened by irregular obsolete axial liræ, which cross the interspaces, and the sutural spaces.

*Dim.*—Length, 7·1 mm.; breadth, 1·8 mm.

*Locality*.—Type in 40 fathoms off Beachport, with 2 others.

*CATOR* *Triphora labiata*, A. Adams. 362

*Triphoris labiatus*, A. Adams, Proc. Zool. Soc., London, 1851, p. 279. *Type locality*—“Sydney, under stones, low water (Mr. Strange).” Angas, Proc. Zool. Soc., London, 1867, p. 209.

*Triphora labiata*, A. Adams, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), vol. xxviii., p. 617, pl. xxxiii., figs. 42, 43, 44; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), p. 60, “Western Port, Victoria.”

Dredged in 62 fathoms, north-west of Cape Border, 2 poor. Taken on the beach, Gulf St. Vincent, 2 good; Venus Bay, West Coast, 11 moderate; St. Francis Island, 11 poor.

The species differs from the typical *T. angasi*, Crosse and Fischer, in its short, stout pupæform figure and its mamillate apex. But a shell from the beach at Kingston and another from the beach of Gulf St. Vincent have the same shape, but a sharp, elongate protoconch like that of *T. angasi*, and might be classed as a pupæform variety of the latter, or a spiculate variety of *T. labiata*.

*/ SO* *Triphora tasmanica*, Tenison-Woods. 346

*Triforis tasmanica*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 28. *Type locality*—“Long Bay, Tasmania.” Tryon, Man. Conch., 1887, vol. ix., p. 184, pl. xxxviii., fig. 31; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 388, fig. 7, text; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902 (1901), p. 86, “Victoria.”

*Triphora*, Hedley, Proc. Linn. Soc., New South Wales, 1903 (1902), part 4, p. 612, pl. xxxii., fig. 22, “100 fathoms, 16 miles east of Wollongong, New South Wales.”

Dredged in 40 fathoms off Beachport, 43 perfect or very good; in 55 fathoms off Cape Borda, 23 poor; in 90 fathoms off Cape Jaffa, 4 poor; in 110 fathoms off Beachport, 1 good, 4 moderate, 1 poor; in 130 fathoms off Cape Jaffa, 4 moderate; in 150 fathoms off Beachport, 1 good; in 300 fathoms off Beachport, 1 poor.

While quite a rare shell on our beach, if present at all, it is comparatively common at 40 and 55 fathoms, where it is in good condition and quite typical in sculpture and colouring. When adult the shell may vary from 9 mm. to 5·25 mm. in length. In the perfectly-formed mouth, which is rarely seen, the posterior gutter is converted into a round orifice by the forward growth of the margin of the aperture and its application to the sutural spiral beyond the sinus, and the basal part of the anterior canal is closed by contact of the projecting spur of the basal lip with the anterior part of the inner lip. The applied parts do not appear to actually coalesce, so as to form absolute tubes, but they produce three distinct apertures.

*ISOTRIPHORA* *lilacina*, var. nov. 347

This is a very pretty variety, with a delicate lilac tint on the apex and a spiral of lilac tubercles above the suture; the rest of the shell is light-brown. That it is only a variety appears from the sculpture of the apex; the adult mouth when perfect with the three apertures, and the brown spots between the pearls of the lowest spiral. It may reach 11 mm. in length, without an adult mouth. Sometimes the lilac tint is absent and replaced by white. It is referred to by Mr. Hedley in his paper quoted above.

Dredged in Gulf St. Vincent, 10 good; in 40 fathoms off Beachport, 15 quite fresh: in 55 fathoms off Cape Borda, 12 good, 5 poor. Taken on the beach, Gulf St. Vincent, 3 good; west coast of South Australia, 3 good; St. Francis Island, 12 good.

*ISOTRIPHORA* *nivea*, var. nov. 348

This variety is pure-white; its protoconch and sculpture are those of *T. tasmanica*, Tenison-Woods. The protoconch is well preserved, and is slightly mamillate. The first whorl begins in the centre, and has slight axial liræ leading to a row of beads, and below this is a beaded carina; in the second whorl are two beaded carinæ. There is no evidence of any earlier protoconch having broken off. In a very large number of examples of *T. tasmanica* in various stages of growth, no individual, however immature, has been observed with a pointed protoconch.

Dredged in Gulf St. Vincent, 3 good; in 40 fathoms off Beachport, 4 good; in 110 fathoms off Beachport, 1 good. Taken on the beach in Gulf St. Vincent, 2 good; in Venus Bay, 1 good; on St. Francis Island, 1 perfect, quite fresh. They are not bleached shells.

150 **Triphora disjuncta**, n. sp. 350

Shell solid, resembling *T. tasmanica*, Tenison-Woods, in its apex, but with rather wide sutural spaces, the three rows of tubercles equal in size, and no dark spots between the tubercles in the supra-sutural row. In these three characters it approaches *T. cinerea*, but this has a bulbous protoconch. Colour, light-brown.

Dredged in 55 fathoms off Cape Borda, 1 good; in 62 fathoms off Cape Borda, 3 good; in 110 fathoms off Beachport, 3 moderate; in 130 fathoms off Cape Borda, 5 moderate: in 300 fathoms off Beachport, 4 good.

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NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART XII.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 5, 1909.]

PLATES XXVI. TO XXIX.

My paper contains descriptions of new species belonging to various genera, but consists chiefly of a revision of the *Pleurotomidae*. Mr. G. F. Angas wrote a paper on the "Marine Molluscan Fauna of South Australia" in the Proceedings of the Zoological Society of London for 1865, p. 155, in which he recorded 11 species, and 6 more in another short one in 1880. In 1893 Mr. Adecock in his "Handlist of the Aquatic Mollusca of South Australia" enumerated 20 species. In 1896 I sent to Mr. Sowerby examples of all species belonging to this family, which had been dredged by me during several years in South Australian waters up to 23 fathoms. He wrote a paper on them, which appeared in Proceedings of the Malacological Society of London, vol. ii., p. 24, and created 17 new species, and revised our previous lists, and brought the number up to 33. Since then my dredging has been extended to three hundred fathoms, and material of quite a different character has been collected. This has furnished examples of several shells previously registered for Victoria, Tasmania, and New South Wales, and especially of species from the deep dredgings of Mr. Hedley and Mr. May, together with quite a number unknown hitherto. This material has been submitted to these two gentlemen and Mr. Gatliff, who have very kindly identified several species from types in their possession or in their State Museums, and have furnished very helpful suggestions, for which I record my thanks.

The group has proved very difficult, chiefly owing to a wide variation, which affects so many of the species, and also to the rather indefinite character of not a few of the genera, making one uncertain as to their limits. In a few instances only has the animal been examined, and some feature been detected by which the shell may be more surely located.

Our family has now grown to the respectable number of 79 species, with 10 named varieties.

*Epidivona**Epidivonaphilip* 294.*Hemipleurotomia quoyi*, Desmoulin. 758

*Pleurotoma quoyi*, Desmoulin, Actes Soc. Linn., Bordeaux, 1842, p. 61; Reeve, Conch. Icon., vol. i., 1843, pl. 16, fig. 137; *Surcula quoyi*, Desmoulin, Tryon, Man. Conch., 1884, vol. vi., p. 167, pl. xxxiv., fig. 82; *Pleurotoma (Surgula) quoyi*, Desmoulin, Weinkauff, Conch. Cab. (Ed. Küster), 1887, Bd. iv., Abt. iii., p. 101, sp. 121, taf. xxii., fig. 2; *Pleurotoma (Drillia) quoyi*, Desmoulin, Watson, Chall. Reps. Zool., vol. xv., 1886, p. 304; *Drillia quoyi*, Desmoulin, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (N.S.), part 2, p. 170, "Western Port, etc."; *Hemipleurotomia quoyi*, Desmoulin, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 368, "Tasmania."

*Pleurotoma philipineri*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 136; Tryon, Man. Conch., 1884, vol. vi., p. 167, pl. xxxiv., fig. 82.

*Pleurotoma monile*, Valenciennoe (non Brocchi) Icon. Coq. Viv. Mon. *Pleurotoma*, p. 52, pl. xv., fig. 3; *Clavatula (Perrona) monile*, Val., Tryon, op. cit., p. 232, pl. vii., fig. 96.

This shell has been placed in several sections or genera. Cossmann, in Essais de Pal coconch. Comp., Deux Livr., 1896, separates the Pleurotomidae with an apical nucleus to their operculum in a family Pleurotominae from the Clavatulinae with a lateral nucleus. In the former he puts the genera *Pleurotoma* and *Drillia*; in the latter *Clavatula* and *Surcula*. This species has an apical nucleus, and is therefore a *Pleurotoma* or a *Drillia*, and not a *Clavatula* or *Surcula*. The sinus, located at the carina and not above it near the suture, makes it a *Pleurotoma* and not a *Drillia*; while the short canal places it in the section *Hemipleurotoma* (Cossmann, 1889).

Dredged alive in 17 fathoms, Investigator Strait; and in 10 and in 19 fathoms, Yankalilla Bay. It has been taken dead at all depths from 10 to 22 fathoms in Gulf St. Vincent and Spencer Gulf, and Backstairs Passage.

A variant was taken in deep water in 110, 150, and 200 fathoms off Beachport, 4 good specimens and 3 very poor, and in 130 fathoms off Cape Jaffa, all dead. It is longer and narrower, and has a less marked carina, and the spiral liræ are less unequal. The type of *P. monile*, Valenc. Kienner's Coq. Viv. Icon., p. 52, pl. xiii., fig. 3, from "the seas of Oceania, the shores of New Holland, at Western Port," shows no nodules either at the suture or at the angle. The transverse liræ are described as striæ, but the figure suggests spiral incisions, equidistant. This is very different from the South Australian form, which has well-marked nodules below the suture and on the angle, and valid spiral sub-distant liræ, with two or three interstitial lirulæ between them. Shells sent me from the type locality, dredged by Mr. Gabriel, are much more typical, and confirm the figure and description, and show our shells to be variants.

*Epidicea* **Hemipleurotomá** *perksi*, Verco. 295 744

*Surcula perksi*, Verco, Trans. Roy. Soc., South Australia, vol. xx., 1896, p. 224, pl. vii., fig. 3, a, b, and c. *Type locality*—"15 fathoms off Thistle Island, Spencer Gulf."

*Asperdaphne*  
**Hemipleurotomá** *vestalis*, Hedley. 828

*Daphnella vestalis*, Hedley, Memoirs Austr. Mus., iv., part 6, 1903, p. 390, fig. 105. "Taken in 24 and 52 fathoms, off Port Stephens and Botany Bay."

Dredged in 104 fathoms 35 miles south-west of Neptune Islands, 2 good dead, 1 fragment. Identified by Hedley from his type.

As this shell has its sinus at the carina and has a short canal, it has been placed in *Hemipleurotomá*.

*Asperdaphne*  
**Hemipleurotomá** *mayi*, n. sp. Pl. xxv., fig. 2. 824

Shell thin, oval, white, of 4 whorls besides a brown protoconch of 2 whorls, which are convex, apparently smooth, but under the microscope very finely spirally lirate and interstitially punctate. Spire-whorls convex medially sharply angulate with a cord, base contracted, and forming a moderately long canal, which is slightly curved to the left. Sutures distinct, finely canaliculate. Aperture obliquely oval; outer lip thin, simple, ridged outside by the spirals, with an obtuse shallow, wide triangular sinus at the angulation. Sculpture: above the angle are three spirals in each whorl, and one below it; in the body-whorl are eighteen, subdistant just below the angle, crowded towards the canal. Very fine axials, about 42 in the penultimate, run obliquely back from the suture to the angle, and then at an obtuse angle obliquely forward to the suture.

*Dim.*—Length, 4·6 mm.; of the body-whorl, 3·1 mm.; width, 2·4 mm.

*Locality*.—Type in 104 fathoms, 35 miles south-west of Neptune Islands, with 2 others dead.

*Diagnosis*.—*D. vestalis*, Hedley, though described as having a smooth protoconch, has it punctate spirally striate, differs in being larger, more solid, more obese, not so sharply angled, and in having a shorter canal, and fewer and more solid axials.

*Variations*.—One example has only one spiral above its very sharp angle, namely, a bold cord just below the suture, making this more channelled; and only one below the angle just above the suture in the second and third whorls, and seven in the body-whorl.

*SPLEN* **Drillia harpularia**, Desmoulin. 779

*Drillia harpularia*, Desmoulin, Actes Soc. Linn., Bordeaux, vol. xii., p. 162; (*Pleurotoma*) Reeve, Conch. Icon., vol. i., 1843, pl. xv., fig. 124; (*Drillia*) Tryon, Man. Conch., vol. vi., 1884, p. 193, pl. xiv., fig. 99; (*Pleurotoma [Crassispira]*) Weinkauff, Conch. Cab. (Ed. Küster), Bd. iv., Abt. iii., p. 97, No. 115, pl. xxi., fig. 2, a and b; (*Drillia*) Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 24; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (N.S.), p. 170, "Portland."

This is a common shell. It has been taken on the beach as far west as LeHunte Bay and St. Francis Island, and is very abundant at Sceales Bay. Dredged alive at all depths from 6 fathoms to 19 fathoms in Gulf St. Vincent and Spencer Gulf. It has not been taken alive or dead beyond 22 fathoms.

The operculum has a medio-lateral internal nucleus; and puts the shell into the subfamily Clavatulinæ and out of Pleurotominae, and therefore out of the genus *Drillia*. It might be transferred to *Clionella*, but if *D. harpularia* is removed probably many other of our *Drillias* should be; and so I have left it with them until more of them have had their opercula examined.

*Gymnatum* **Drillia exaratum** Reeve.



*Pleurotoma exarata*, Reeve, Proc. Zool. Soc., London, 1845, p. 112; Conch. Icon., 1845, pl. xxiii., fig. 201, "habitat unknown"; (*Drillia*) Tryon, Man. Conch., 1884, vol. vi., p. 204, pl. xii., fig. 14; (*Pleurotoma [Crassispira]*) *exaratum*, Reeve, Weinkauff, Conch. Cab. (Ed. Küster), 1887, Band iv., Abt. iii., p. 205, No. 226, pl. xxxix., fig. 12; (*Drillia*) Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 24, "Gulf St. Vincent (J. C. Verco)."

Taken on the beach, St. Francis Island, 4 good. Dredged alive in 9 fathoms Port Lincoln, and in 22 fathoms in Backstairs Passage, and dead at intermediate depths off Middleton and in Gulf St. Vincent.

*FILD* **Drillia costicapitata**, n. sp. Pl. xxvii., figs. 1 and 2 738

Shell solid, high, narrow, conical, blunt at the apex, roundly much contracted at the base. Protoconch mammilate, of two and a quarter whorls, with eighteen round axial ribs. Suture linear, quite inconspicuous. Spire-whorls five, straight, sloping, with two carinae, slightly nodulated, equidistant from each other and the sutures, the lower much the larger and rounder. Other spirals arise, so that in the penultimate there are two above each carina and two below the lower; in the body-whorl there are twelve below it; they are steep behind and sloping in front. Very fine sinuous growth striæ cross them. Aperture roundly rhomboidal,

canal short and open, slightly bent to the left. Outer lip thin, simple, crenulated outside by the spirals. Colour dull-creamy-white, with irregular faint-brown narrow axial flames, with a tendency to follow the curve of growth lines. The larger carinae are more or less regularly articulated with brown.

*Dim.*—Length, 8 mm.; body-whorl, 4·6 mm.; width, 3·3 mm.

*Locality*.—Type in 40 fathoms off Beachport, with 5 others.

The protoconch is not the usual one of *Drillia*; it resembles closely that of *Fusus lincolnensis*, Crosse and Fischer, but the growth lines indicate a shallow, round sinus just below the suture, between the two carinae, which is not found in *Fusus*. The type is immature, and the others are imperfect. A perfect adult may eventually determine the genus.

AUSTR *Drillia dimidiata*, Sowerby.

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*Drillia dimidiata*, Sowerby, Proc. Mal. Soc., London, vol. ii., 1896, p. 24, pl. iii., fig. 2. *Type locality*—“Backstairs Passage, 16-18 fathoms (Verco).”

It may reach a length of 14 mm. Dredged in 12 fathoms off Porpoise Head, 1 dead; in 16-18 fathoms Backstairs Passage, 1 recent; in 19 fathoms Yankalilla Bay, 1 dead; in 20 fathoms off Newland Head, 1 dead; in 22 fathoms Backstairs Passage, 2 dead; in 40 fathoms off Beachport, 3 moderate.

FLD *Drillia dulcis*, Sowerby.

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*Daphnella dulcis*, Sowerby, Proc. Mal. Soc., London, vol. ii., 1896, p. 26, pl. iii., fig. 5. *Type locality*—“Gulf St. Vincent (Verco); also var. *alba*.

Sowerby says in a note to his definition:—“There are no longitudinal ribs,” but in the shell returned to me as the type there are very faint oblique axial plications, and in some specimens since collected these may be properly styled axial riblets. The shell may be of a dark-brown colour, with bands and flames of darker tint, or any lighter shade of brown to white, the tip being generally most coloured.

Mr. Hedley, on seeing my specimens, wrote:—“What I named as a variety of *D. haswelli*, Hedley, from Cape Pillar (Records of the Austr. Mus., vol. vii., No. 2, 1908, p. 112), is evidently your *D. dulcis*, Sow. Typical *D. haswelli* is distinct.”

Dredged in 15, 16, 17, 20 fathoms in Gulf St. Vincent, Spencer Gulf, Backstairs Passage, and Investigator Strait, more than 80 alive and dead; in 15-20 fathoms off St. Francis Island, 2 very good; in 35 fathoms, 1 good and 3 poor;

in 40 fathoms off Beachport, 1 poor. Its habitat seems to be mostly under 25 fathoms.

*Spideira Drillia jaffaensis*, n. sp. Pl. xxvi., figs. 7, 8, and 9. *446*

Shell turreted-oval, of 7 whorls, including the blunt protoconch of 2 smooth convex whorls, with a subimpressed suture, ending abruptly. Spire-whorls convex, angulated in the first and second below the middle, and at the middle in the fourth; with a subsutural threadlet in the first which enlarges progressively to a stout round spiral; in the second another appears midway between the angulation and the lower suture; and in the fourth another below this; in the fifth or body-whorl two fine spirals appear above the angulation, and there are thirteen below it, becoming fainter and lower anteriorly; they are much narrower than the interspaces; the spiral just below the suture, and that at the angulation are the most valid, and are well nodulated, the nodules being somewhat pliciform, directed downwards and backwards on the former, and downwards and forwards on the latter; the next two spirals are nodulated, but less so, also downwards and forwards. Axial liræ, starting from the suture, are directed downwards and backwards to the nodules on the first spiral, are then concave forwards between these and the nodules on the angulation, and then run obliquely convexly forward to the nodules on the next two spirals; on these, by intercalated liræ, the nodules are doubled in number, but are almost imperceptible on the spirals beyond. Body-whorl is rhomboidal, concavely contracted at the base. Aperture squarely oval, opening into a short, wide canal. Labrum thin, angulated at the upper fourth, slightly crinkled by the spirals, pinched in front to form the canal; in profile it has a deep trigonal sinus between the suture and the angle, is then convex, and has a shallow excavation where the aperture is pinched. Inner lip is a narrow glazed depression; columella straight. Colour white.

*Dim.*—Length, 8·8 mm.; of body-whorl, 5 mm.; breadth, 3·5 mm.

*Locality*.—Type from 130 fathoms off Cape Jaffa with 1 other; in 104 fathoms off Neptune Islands, 8 good, 25 immature or broken; in 110 fathoms off Beachport, 2 good; in 300 fathoms off Cape Jaffa, 2 very poor.

*AUSTRODrillia achatina*, n. sp. Pl. xxvi., fig. 2. *463*

Shell solid, elongate-fusiform, of 6½ whorls, including the blunt protoconch, which merges into the spire insensibly. The first whorl and a half are smooth and rather flat; the next is scarcely convex, and has at first distant invalid axial angu-

lations, which gradually become more numerous and costulate; in the next whorl they become more distant again, and remain throughout the shell as feeble axial angulations which are just visible when looking at the shell from the apex. The spire-whorls are subconvex, subangulate just below the middle, and have the upper fourth somewhat adpressed just below the simple impressed suture. Aperture oblique oblong-ovate; canal short, wide, scarcely notched; outer lip solid but sharp, with a deep round sinus separated from the ascending suture by a callus from the posterior part of the inner lip, then straightly convexly antecurrent to two shallower sinuses at the base of the canal; inner lip a complete smooth thin applied glaze, thickened behind. Spiral incisions, which begin in the second half of the first sculptured protoconchial whorl, cut the surface up into flat slightly rounded ribs, increasing to eleven in the penultimate and twenty-four in the body-whorl, the second below the suture and that at the angulation being the widest. Microscopic accremental striæ scratch the whole surface and have the sinuosities of the outer lip. A narrow white spiral, articulated with brown, ornaments the angulation; with a fainter narrower one above, and a rather wider brown spiral articulated with white runs from the back of the aperture over the dorsum nearly to the lip margin. The general colour is brown, with darker irregular spots and clouds.

*Dim.*—Length, 7·9 mm.; of body-whorl, 4·7 mm.; breadth, 2 mm.

*Locality.*—Type alive in 20 fathoms 7 miles south-west of Newland Head; in 40 fathoms off Beachport, 3 fresh and 3 poor; in 55 fathoms off Cape Borda, 1 fresh; in Gulf St. Vincent at unrecorded depth, 1 fresh.

One example shows some ten previous labral edges in the body-whorl, sinuously marked out in white, and followed by deep-brown, which gradually fades out at the next labral edge. The affinity of this species is close to *D. agrestis*, which may possibly be a rude costate variant.

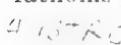
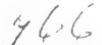
### *AustroDrillia agrestis*, n. sp. Pl. xxvii., fig. 7. 764

Shell solid, rugged, elongate-fusiform, of  $7\frac{1}{2}$  whorls, including the protoconch of one whorl and a half, smooth, round, and blunt. Spire-whorls sloping, scarcely concave in the upper part, convex in the lower. Suture distinct, with a narrow adpressed margin. Body-whorl concavely attenuated at the base. Aperture obliquely oval, shortly contracted posteriorly; canal short, open, barely notched. Outer lip sharp, slightly ascending at the suture, with the posterior

sinus deep, rather narrow, separated from the suture by a distance equal to its width, then convex, with an anterior shallow sinus at the base of the canal. Inner lip inconspicuous, applied, smooth, with a callosity at its junction with the outer lip. Sculpture: the first two whorls are closely, regularly, validly, axially costulate, the rest rudely ribbed in the anterior two-thirds; ribs oblique, rounded, rather wider than the interspaces, becoming less marked and more distant on the body-whorl, and almost absent on the base, about 14 in the penultimate; sublenticular accremental incisions. Spiral incisions are deep, irregularly slightly wavy, about 8 in the penultimate, and 20 in the body-whorl, nearly equidistant, in places alternately fine and wide. Colour uniform light-straw tint.

*Dim.*—Length, 8·5 mm.; of aperture, 3·25 mm.; breadth, 3 mm.: of aperture, 1 mm.

*Locality.*—Type in 40 fathoms off Beachport; in Gulf St. Vincent, depth unrecorded, 7 fresh and dead; in 17 fathoms Backstairs Passage, 1 alive, 2 dead.

4.  **Drillia subplicata.** n. sp. Pl. xxvii, fig. 6. 

Shell short, solid, narrowly oval, with a blunt apex and slightly contracted base. Protoconch of two smooth, slightly convex whorls. Spire-whorls four, sloping scarcely convex. Sutures linear. Aperture oval, slightly contracted behind, opening widely into a very short canal in front. Outer lip simple; with a shallow, round sinus near the suture, a convex profile, and a very faint sinus anteriorly. Inner lip a complete, applied narrow glaze. Columella straight, slightly bent to the left in the canal. Faint oblique axial costæ, equal to the interspaces; well-marked crowded sinuous accremental striae: no spiral sculpture. Light-brown, with a band of lighter colour on the middle of the spire-whorls, whitish where it crosses the costæ; three light bands on the body-whorl.

*Dim.*—Length, 7 mm.; breadth, 3 mm.

*Locality.*—Type 40 fathoms off Beachport; 110 fathoms, 1 moderate; in 130 fathoms off Cape Jaffa, 1 poor.

*Diagnosis.*—Mr. Hedley writes:—"This is not my *D. nenia*. Yours lacks the ribbing of my shell, is broader, and more solid, the notch is shallower, and the canal shorter."

**Drillia nenia**, Hedley.

*Drillia nenia*, Hedley, Memoirs Austr. Mus. iv., part 6, 1903, p. 387, fig. 101. *Type locality*—“24 fathoms, Port Stephens”; also Records Austr. Mus. vi., part 2, p. 42.

Dredged in 200 fathoms off Beachport, 1 perfect; in 110 fathoms, 1 good.

**Drillia woodsi**, Beddoe.

*Drillia woodsi*, Beddoe, Proc. Roy. Soc., Tasmania, 1883 (1882), p. 167. *Type locality*—"Long Bay, D'Entrecasteaux Channel, Tasmania"; Tate and May, Proc. Linn. Soc., New South Wales, xxvi., 1901, part 3, p. 368; Hedley, Memoirs of Austr. Mus., iv., part 6, 1903, p. 388, "New South Wales coast."

*Drillia howitti*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, vol. xii. (N.S.), 1899, p. 101, pl. viii., fig. 2. *Type locality*—"Gippsland coast."

Mr. Gatliff has kindly identified South Australian shells as *D. howitti*; Tate and May, and Hedley, *loc. cit.*, give this as a synonym of *D. woodsi*, Bedd., and Mr. May says ours are undoubtedly *woodsi*, from comparison with a drawing he made from Beddoe's type, and though I have not seen this, on trust in their determination, I have called our shell *D. woodsi*, Bedd.

Taken on Middleton Beach, solid and much rolled. Dredged in 90 fathoms off Cape Jaffa, 1 good; in 104 fathoms off Neptune Islands, 1 good and 6 broken; in 110 fathoms off Beachport, 2 good, 17 poor or broken; in 130 fathoms off Cape Jaffa, 8 very poor; in 200 fathoms off Beachport, 2 good, and 7 poor or immature; in 300 fathoms off Cape Jaffa, 1 poor.

*Splendrillia* ~~sp.~~ *acostata*, n. var. 771

This differs in having no axial costæ, and in being less solid. That it is only a variety appears from two facts—first, the validity of the costæ can be graded in a series of examples from well-marked to absent; second, some shells have the costæ valid in the earlier whorls, but they fade to extinction in the later. It may reach a length of 21·5 mm., and have 12 whorls. Some individuals show 2, 3, or 4 opaque whitish hair lines in the substance of the spire-whorls. They are frequently prettily coloured, pinkish-salmon, with three rather indistinct bands in the body-whorl, a broad one below the suture, not distinctly bounded inferiorly, a second thin median band, and the third over the base and canal. In the spire they form an infra-sutural and a supra-sutural band.

Dredged in 110 fathoms Beachport, 2 good, 3 poor, 5 immature; in 130 fathoms off Cape Jaffa, 4 good, but immature; in 150 fathoms off Beachport, 15 moderate and poor; in 200 fathoms off Beachport, 17 good, 14 poor. They seem to favour the deeper waters, and to be more numerous than the typical forms there.

*Inquisitor Drillia coxi*, Angas. 762

*Drillia coxi*, Angas, Proc. Zool. Soc., London, 1867, p. 113, pl. xiii., fig. 15. *Type locality*—"Port Jackson"; *ibid.*, p. 203; Tate

and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 368, Tasmania; Hedley, Memoirs Austr. Mus., iv., part 6, 1903, p. 388, "may be 33 mm. long. Dredged in 28 fathoms off Manning River, New South Wales."

*Drillia sinensis*, Hinds, Tryon, Man. Conch., 1884, vol. vi., p. 201, pl. xi., fig. 6. He gives Angas' species as a synonym, but Hedley, loc. cit., dissents.

Dredged in 200 fathoms off Beachport, 2 moderate; in 100 fathoms, 1, 20·8 mm. in length.

### *Sp. n.* — **Drillia gratiosa**, Sowerby. 769

*Drillia gratiosa*, Sowerby, Proc. Mal. Soc., London, vol. ii., 1896, p. 25, pl. iii., fig. 1. *Type locality*—"Gulf St. Vincent (Verco)."

Dredged in 17 fathoms off Point Marsden, 1 decolourized; in Gulf St. Vincent, depth unrecorded, 1 alive, 1 dead, 1 broken; in 22 fathoms off Cape Willoughby, Kangaroo Island, 1 quite fresh; in 49 fathoms off Beachport, 1 large and good.

When fullgrown it may be 20 mm. long by 6·25 broad, and has a callus pad about 3 mm. long and 1 mm. high at its centre at the back of the internal lip; the posterior edge of the sinus is slightly reflected.

### *Sp. n.* **Drillia bednalli**, Sowerby. 769

*Drillia bednalli*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 25, pl. iii., fig. 3. *Type locality*—"Gulf St. Vincent (Verco)"; Tate and May, Proc. Linn. Soc., New South Wales, vol. xxvi., 1901, p. 368, who regard it as a variety of *D. woodsi*, Beddoe.

Although it varies a good deal, as Sowerby points out, it does not seem to me to grade into *D. woodsi*, but to retain a valid spiral lira midway between the angle and the suture, and some fine spiral striae between the angle and the suture.

Dredged alive in 17, 20, and 22 fathoms in Investigator Strait; and dead at depths from 6 to 22 fathoms in Gulf St. Vincent, Spencer Gulf, in and outside Backstairs Passage. Taken on the beach, and alive in 15 to 20 fathoms, Petrel Bay, St. Francis Island.

### *Bathydoma* **Drillia hecatorgia**, Verco. 751

*Drillia hecatorgia*, Verco, Trans. Roy. Soc., South Australia, 1907, vol. xxxi., p. 215, fig. 3. *Type locality*—"104 fathoms, off Neptune Island."

### *Inquisitor* **Drillia hedleyi**, n. sp. Pl. xxvi., fig. 6. 761

Shell solid, narrow, elongate-fusiform, of 9 whorls, including the protoconch of 3 convex smooth whorls, with a deep impressed suture. Spire-whorls convex, roundly angled

below the middle in the early whorls, above it in the later, slightly adpressed below the linear suture. Body-whorl concavely attenuate at the base. Aperture narrow elongate-oval, ending in a moderately long open canal, which expands slightly in front, bends a little to the left, and is barely recurved. Outer lip thick, sharp-edged, with a deep oblique posterior sinus of three-quarters of a circle, having a thickened reflected margin, and separated from the base of the whorl by a callous pad derived from the inner lip; then straightly convex, with a wide, very shallow excavation at the base of the canal. Inner lip complete, applied, smooth; columella long, nearly straight. Axial costæ are oblique, fading out above the angle, rounded, nearly as wide as the spaces, ten in the penultimate, absent from the base. The spiral liræ are crowded, fourteen in the penultimate, very close-set on the base, granulated by fine accremental striæ. Colour in a fresh cotype is dull-white, with faint-brown clouding between the ribs, and a faint-brown band above the suture and round the periphery of the body-whorl.

*Dim.*—Length, 18·6 mm.; of the body-whorl, 11 mm.; breadth, 4·5 mm.

*Locality.*—Type from 200 fathoms off Beachport. Dredged also in 90 fathoms off Cape Jaffa, 1 very good, 1 poor; in 104 fathoms 35 miles south-west of Neptune Islands, 10 good, immature, dead; in 110 fathoms off Beachport, 2 fresh, 3 good, 1 broken.

*Fl. ODrillia trophonoides*, n. sp. Pl. xxvi., figs. 3 and 4. 744

Shell solid, white, high, narrow, conical, with a blunt apex and rounded base; of  $9\frac{1}{2}$  whorls, including a protoconch of  $2\frac{1}{2}$  convex whorls, the first two smooth, the rest faintly subdistantly axially plicate, ending abruptly. Spire-whorls convex. Sutures distinct, subcanaliculate. Body-whorl short, roundly contracted at the base. Aperture roundly oval, widest behind, roundly contracted in front, constricted at its junction with the canal. Outer lip sharp, simple, scarcely inflected, convexly retreating from the suture to form a semi-circular sinus, then convexly antecurrent to a very slight anterior sinus at the constricted neck of the canal. Inner lip a thin, complete glaze; base roundly concave; columella straight, curved to the left in the canal, and slightly thickened on the outside of its anterior end. Narrow spiral cords, one-third as wide as their interspaces, increase from four in the first whorl to nine in the penultimate, and twenty-three in the body-whorl, and are minutely roughened by sub-lenticular accremental striæ.

*Dim.*—Length, 14·4 mm.; of body-whorl, 7·1 mm.; width, 5·2 mm.

*Locality.*—Type from 150 fathoms off Beachport, with 1 other; also taken in 55 fathoms off Cape Borda, 1 poor; in 104 fathoms off Neptune Islands, 4 good and 11 immature, all fresh; in 110 fathoms off Beachport, 2 moderate; in 130 fathoms off Cape Jaffa, 2 poor; in 200 fathoms off Beachport, 1 good.

**AUSTRODrillia saxea**, Sowerby.

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*Drillia saxea*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., part 1, p. 25, pl. iii., fig. 4. *Type locality*—“Gulf St. Vincent (Verco).”

The type was a bleached dredged shell. Specimens taken since show an infrasutural spiral row of brown spots between the axial plicæ, spirally elongate. On the body-whorl are three faint continuous spiral brown bands, and very faint curved axial bands.

It is quite common as a deep-water form, and has been taken in 40 fathoms off Beachport, 31, many quite fresh and coloured; in 55 fathoms off Cape Borda, 9 coloured, 30 dead; in 90 fathoms off Cape Jaffa, 19 dead, some of them fairly fresh; in 104 fathoms off Neptune Islands, 73, a few fresh, mostly immature and opaque; in 110 fathoms off Beachport, 65, some quite fresh; in 130 fathoms off Cape Jaffa, 58, opaque or rolled; in 150 fathoms off Beachport, 16 decolourized; in 200 fathoms off Beachport, 1 fresh, 6 dead; in 300 fathoms off Cape Jaffa, 29 opaque. Their habitat seems to be from 110 to between 20 and 40 fathoms.

**F140 Drillia lacteola**, n. sp. Pl. xxvi., fig. 5. 741

Shell thin, translucent-white, of 6 whorls, including the protoconch of 2 smooth convex whorls. Spire-whorls convex. Suture simple, narrowly margined. Body-whorl roundly contracted at the base; aperture elongate-oval, opening widely into a short canal. Outer lip simple, thin, crenulated outside; with a deep rounded posterior sinus near the suture, having a thickened and slightly erect edge, with a shallow excavation anteriorly where it is pinched to form the canal. Inner lip complete, applied, glazed, thin, thickened at the back to meet the margin of the sinus. Columella nearly straight. Spirals thin, seven in the penultimate, twenty in the body-whorl; faint accremental striæ minutely roughening the sculpture.

*Dim.*—Length, 4·8 mm.; of body-whorl, 3·1 mm.; breadth, 2·1 mm.

*Locality.*—Type from 90 fathoms off Cape Jaffa, with 22 others, good; in 130 fathoms, 21 good; also off Beachport

in 110 fathoms, 34 good; in 150 fathoms, 10 good; in 200 fathoms, 2 good; in 62 fathoms north-west of Cape Borda, 10 good and 4 immature.

Mr. Hedley, to whom this species was submitted, writes:—"Mr. May and I took this in 100 fathoms off Cape Pillar. I catalogued it (Records Austr. Mus., vol. vii., No. 2, 1908, p. 112) as *Drillia haswelli*, Hedley, but on reconsideration I should regard it as new." It is narrower than *D. haswelli*, its whorls are not angulated, the body-whorl is not so pyriform, and the spirals are much more valid.

*Filodrillia* var. *crebrespirata*, n. var. 742

This shell is more solid and opaque, is 5·5 mm. long, its body-whorl is 3 mm., its breadth is 2·1 mm.; it has 15 spiral liræ in the penultimate and 50 in the body-whorl, crossed by crowded accremental striae.

Two perfect individuals were taken in 49 fathoms off Beachport.

*Filodrillia* var. *sinusegens*, n. var. 743

It is just like *lacteola* in size, shape, and sculpture, but that the aperture is not pinched anteriorly to form a canal, and there is no anterior sinus in the outer lip here. One perfect example was taken in 100 fathoms off Beachport.

*Filo Drillia tricarinata*, Tenison-Woods. 745

*Drillia tricarinata*, Tenison-Woods, Proc. Linn. Soc., New South Wales, ii., 1878, p. 265. *Type locality*—"45 fathoms, off Port Jackson Heads"; Hedley, Records Austr. Mus., iv., 1891, p. 23, fig. 3; Hedley, Memoirs Austr. Mus., iv., part 6, 1903, p. 389, fig. 104.

This shell varies much in shape and sculpture. There may be three sharp spirals on each of the four spire-whorls in a shell 8 mm. long, or two on the first and second spire-whorls, an intercalated third thread on the third whorl, and three on the fourth whorl. The shell may be shorter and more solid, with two very strong spirals on all the spire-whorls, and a weak intercalated thread on the fourth, with about twenty obsolete axial liræ on the second and third whorls, much less marked on the fourth. It may be short and wide, with only two spirals in the spire-whorls, but in the first and second, or first, second, and third whorls oblique axial liræ almost as valid as the spirals may cross and tuberculate these, and fade out in the later whorls. It may be a long narrow shell, only 2·5 mm. broad, with four spirals in each whorl, and with 16 oblique axial liræ like those in

the previous form; or it may be a shell of 10 mm. by 3·5 mm., with two spirals in the first two whorls, three in the second two, and four in the fifth whorls, with oblique narrow axial costæ, 17 in the penultimate, as valid as the spirals, tuberculating the intersections, and mildly coronating the uppermost spiral. Several of these might be regarded as distinct species did not intermediate forms reveal a complete gradation between them.

Dredged in 90 fathoms off Cape Jaffa, 5 moderate; in 110 fathoms off Beachport, 4 good; in 130 fathoms off Cape Jaffa, 1 alive, 22 good; in 150 fathoms off Beachport, 10 good; in 200 fathoms off Beachport, 5 good, 1 poor; in 300 fathoms off Cape Jaffa, 4 good, 23 poor and broken.

### **Drillia-dilecta**, Hedley.

*Drillia dilecta*, Hedley, Memoirs Austr. Mus., iv., part 6, 1903, p. 387, fig. 100. *Type locality*—"Port Stephens, New South Wales"; also Records Austr. Mus., vi., part 2, 1905, p. 42, "111 fathoms off coast of New South Wales."

Mr. Hedley writes:—"Certainly *D. dilecta*, Hedley; the variation is slight; your shell is a little larger, has a spiral more, and fewer weaker intercostal radial threads. All mine have a broken lip, and I now see for the first time the deep sinus which is typical, and to be added to the diagnosis."

An infrasutural valid lira limits posteriorly the labral sinus, which is bounded anteriorly by the most valid lira on the whorl; a very fine threadlet runs nearly midway between the two; the sinus is deep and rather narrow.

Dredged in 90 fathoms Cape Jaffa, 3 good, 8 immature; in 130 fathoms, 2 perfect and 2 poor; 300 fathoms, 1 poor; in 104 fathoms 35 miles south-west of Neptune Islands, 17 good, some of them immature; in 150 fathoms off Beachport, 1 perfect, 5 poor.

### *For ~~coelostoma~~ parabola*, n. var. *γ 39*

It differs from the type in having a much wider, more open, parabolic labral sinus; in having more numerous spirals on the whorls, 6 in the penultimate and 24 on the body-whorl; and in having six liræ instead of one between those which bound the labral sinus. Only two examples were taken—one in 90 fathoms off Cape Jaffa, and one in 200 fathoms off Beachport. Other specimens may establish it as a distinct species or confirm it as a variant.

*Exonixus*  
*lescopialis*  
*entazona*  
*ris*

### **Drillia cancellata**, Beddome. *8/2 1870*

*Mangelia cancellata*, Beddome, Proc. Roy. Soc., Tasmania, 1883 (1882), p. 167. *Type locality*—"Kelso Bay, Tamar River, 17 fathoms."

*Drillia cancellata*, Beddome, Tate and May, Proc. Linn. Soc., New South Wales, vol. xxvi., 1901, p. 368, pl. xxiv., fig. 27.

*Drillia telescopialis*, Verco, Proc. Roy. Soc., South Australia, vol. xx., 1896, p. 222, pl. vii., fig. 1, a, b, c. Type locality—"Backstairs Passage."

*Drillia pentagonalis*, Verco, loc. cit., pl. vii., figs. 2 and 2a, 1906, p. 298; Hedley, Records Austr. Mus. vi., part iv., "80 fathoms off Narrabeen."

Mr. W. L. May, of Tasmania, writes May, 1897:—"I have had an opportunity of examining the type specimens of *Mangelia cancellata*, Beddome. There are a number of specimens in the box, and they are very variable, ranging from your *D. telescopialis* to *D. pentagonalis*. There are several intermediate forms. I should consider that *M. cancellata* came about halfway between your species, and that they all belong to one very variable species, *M. cancellata*."

Dredged in 20 fathoms Investigator Strait, 1: in 35 fathoms off St. Francis Island, 1 dead, brown colour; in 55 fathoms off Cape Borda, several good; in 90 fathoms off Cape Jaffa, 1 perfect; in 110 fathoms off Beachport, 1 perfect, 1 broken; in 130 fathoms off Cape Jaffa, 2 perfect.

### *Asperidaphne Clathurella walcotae*, Sowerby. 829

*Drillia walcotae*, Sowerby, Proc. Zool. Soc., London, 1893, p. 487, pl. xxxviii., figs. 7 and 8. Type locality—"Spencer Gulf"; also Proc. Mal. Soc., London, 1896, vol. ii., p. 24; var. *pallida*, "from MacDonnell Bay (Adcock)."

Dredged alive in 13 fathoms Spencer Gulf; 17 fathoms and 20 fathoms Backstairs Passage; and dead from 8 fathoms upwards; in 40 fathoms off Beachport, 3 quite fresh. Taken on the beach St. Francis Island, 2 good.

The foot is about half as long as the shell, truncated in front, pointed behind; white; the sole dotted abundantly with small orange-brown spots, larger and darker along the margins; upper-surface with brown spots as large as pins' heads, with a deep-purple-brown central dot, also at the junction with the body; muzzle dark-spotted; siphon light-brown, with small spots. Tentacles and eyes exactly like *Glyphostoma paucimaculata*, Angas. No trace of an operculum to be found; hence I have removed it from *Drillia* to *Clathurella*.

### *LTKEMA crassina* *Clathurella philomena*, Tenison-Woods. 777

*Clathurella philomena*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1875) 1876, p. 141. Type locality—"East coast of Tasmania"; Pritchard and Gatiliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii., p. 177, "Victorian coast"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 371.

*Drillia atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876, p. 142, teste Tate and May, loc. cit.

*Siphonalia pulchra*, Tenison-Woods, op. cit., 1877, p. 139, teste Tenison-Woods, op. cit., (1879) 1880, p. 70.

*Clathurella crassina*, Angas, Proc. Zool. Soc., London, 1880, p. 416, pl. xl, fig. 6.

Mr. Sowerby in Proc. Mal. Soc., London, 1896, vol. ii., p. 28, identified South Australian shells sent to him by me as *Clathurella parvula*, Reeve. This may be, but is not certain. Mr. Hedley has suggested their identity with *Drillia denseplicata*, Dunker, Malak. Blätt., 1871, vol. xviii., p. 159, from Bass Strait, figured in Conch. Cab. Küster's Ed., Band iv., Abt. iii., No. 130, p. 107, pl. xxiii., figs. 7 and 9. This is most likely, but as it is not certain I have retained the name accepted by Tate and May and Gatliff, until the types of the two species above referred to can be compared with our shells.

These are very commonly taken in deeper water, and they vary so remarkably that they might be differentiated into about half a dozen apparently good species but for the intermediate forms. It has been taken on the beach from Robe to Leflunte Bay in the Great Australian Bight, and dredged at all depths from 6 to 300 fathoms.

The usual form has a somewhat gradate spire, and has valid axial costæ crossed by well-marked spiral liræ. The axials may be less valid in a series of specimens until they completely vanish and only spirals remain, and the angle may fade away as well, until a shell of a seemingly distinct species remains, "exactly like the form taken in 100 fathoms at Cape Pillar" by Hedley and May. It may become long and narrow, and delicate, especially in the greater depths; or on the seashore, as on St. Francis Island, it may be very short, extremely solid, and with very rough, sturdy sculpture; or, again, from the greater depths it may be very short, very gradate, and with a comparatively long body-whorl and without axials, so as to approach close to *Drillia haswelli*, Hedley, and to be recorded by him as a variety of this species in his list of mollusca from Cape Pillar in Records Austr. Mus., vol. vii., No. 2, 1908, p. 112.

### *Gtrema*-**Clathurella bicolor**, Angas. 774

*Clathurella bicolor*, Angas, Proc. Zool. Soc., London, 1871, pl. i., fig. 20. Type locality—"Port Jackson"; op. cit., 1880, p. 416, "recorded for South Australia"; Tryon, Man. Conch., 1884, vol. vi., p. 284, pl. xvi., fig. 61; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii., p. 179, "Western Port."

Dredged alive from 5 fathoms to 22 fathoms in Gulf St. Vincent and in Spencer Gulf; in 40 fathoms off Beachport,

2 perfect, but rolled; in 45 fathoms off Neptunes, 1 good; in 55 fathoms off Cape Borda, 1 moderate; in 110 fathoms off Beachport, 1 very poor. Taken on the beach, west along our coast to Murat Bay, and St. Francis Island. About 25 fathoms would seem to be the limit of its deeper habitat.

*Gervaleus*

*Clathurella lallemantiana*, Crosse and Fischer. 794

*Pleurotoma (Clathurella) lallemantiana*, Crosse and Fischer, Jour. de Conch., 1865, vol. xiii., p. 425, pl. xi., fig. 5. *Type locality*—“Rapid Bay, Gulf St. Vincent”; Tryon, Man. Conch., 1884, vol. vi., p. 286, pl. xvii., fig. 86, he makes it a variety of *C. letourneuxiana*, Crosse; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 28, who dissents from Tryon’s opinion; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii., p. 177, “Port Phillip and Western Port”; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 371, “Tasmania.”

*Drillia incrusta*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 136. *Type locality*—“North coast of Tasmania,” *testa* Sowerby, and Tate and May loc. cit. supra.

Dredged alive in 9 fathoms Port Lincoln; and in 5, 15, and 20 fathoms Gulf St. Vincent; in 200 fathoms off Beachport, 1 very poor. Taken on the beach Murat Bay, West Coast.

*Gervaleus*

*Clathurella letourneuxiana*, Crosse and Fischer. 795

*Pleurotoma (Clathurella) letourneuxiana*, Crosse and Fischer, Jour. de Conch., 1865, p. 425, pl. xi., fig. 7. *Type locality*—“Sydney”; *Mangilia letourneuxiana*, Crosse, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1877) 1878, p. 28, “Tasmania.”

*Clathurella letourneuxiana*, Crosse, Tryon, Man. Conch., 1884, vol. vi., p. 286, pl. xvii., fig. 87; Pritchard and Gatliff Proc. Roy. Soc., Victoria, (1899) 1900, p. 177, “Port Phillip and Western Port”; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 371.

Dredged in Gulf St. Vincent, 17 quite fresh; in 110 fathoms off Beachport, 4 poor, and in 150 fathoms, 1 poor; in 130 fathoms off Cape Jaffa, 2 moderate, 1 poor. The examples from deep-water are uncoloured, the apex is not so acute (probably worn down), and the body-whorl is comparatively longer. Several specimens with the other characters typical of this species have the two revolving spirals of *C. lallemantiana*, Crosse.

*Gervaleus* ~~Ker~~ *cuspis*, Sowerby.

784

*Mangilia cuspis*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 31, pl. iii., fig. 17. *Type locality*—“Gulf St. Vincent.”

Mr. Sowerby says on page 32 of *M. letourneuxiana*, Crosse:—“I have no evidence that this species occurs in South Australia. Specimens of *M. lallemantiana* have been

mistaken for it." I am, however, disposed to think *M. cuspis* is a short-spired form of *M. letourneuxiana*, into which it seems insensibly to run, as the latter species is recognized by conchologists in Sydney, Melbourne, and Tasmania; and I am also disposed to believe Tryon is right in classing *M. lallemantiana* as a variety in the opposite direction.

*Isoploclathurella* **Clathurella desalesii**, Tenison-Woods. 322

*Mangelia de Salesii*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 138. Type locality—"Long Bay, Tasmania."

*Clathurella desalesii*, Tenison-Woods, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 371, pl. xxiv., fig. 32.

Dredged in Gulf St. Vincent, 13 fresh; in 40 fathoms off Beachport, 1 good; in 110 fathoms, 2 good: in 130 fathoms off Cape Jaffa, 2 poor.

**Clathurella st. gallæ**, Tenison-Woods.

*Mangelia st. gallæ*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 137, with var. *benedicti*. Type locality—"Long Bay, Tasmania"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906 (1905), vol. xviii., p. 50, "Western Port."

Dredged in 40 fathoms off Beachport, 19 good; in 110 fathoms, 4 very good, 3 moderate; in 150 fathoms, 1 poor; in 130 fathoms off Cape Jaffa, 6 good. This species would appear to affect the deeper water.

*Pseudosiphonella* **Clathurella modesta**, Angas. 330

*Clathurella modesta*, Angas, Proc. Zool. Soc., London, 1877, p. 38, pl. v., fig. 15. Type locality—"Port Jackson"; Tryon, Man. Conch., 1884, vol. vi., p. 285, pl. xvii., fig. 92; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 28, "Gulf St. Vincent"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii., p. 176, "Port Phillip and Western Port"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "Frederick Henry Bay, Tasmania."

Dredged in Gulf St. Vincent, 15 alive and dead; in 15 to 20 fathoms off St. Francis Island; in 40 fathoms off Beachport, 3 quite fresh and 2 moderate; in 55 fathoms north-west of Cape Borda, 3 moderate. Taken on the beach at Aldinga (Mr. Kimber) and at Venus Bay, West Coast.

A colour variety, with precisely the same shape and sculpture, is white with a brown spiral below the suture, and a second winding round the base and over the snout. Sometimes these spirals are represented only by distant spots. It was dredged in 40 fathoms off Beachport, 4 good; in 55

fathoms north-west of Cape Borda, 4 moderate; in 62 fathoms, 2 moderate; in 110 fathoms off Beachport, 30 fairly good; in 130 fathoms off Cape Jaffa, 17 poor. Taken on the beach at Venus Bay, 3 good; and on St. Francis Island, 4 good.

*Pseudoclathrella* **Clathurella rufozonata**, Angas. 831

*Clathurella rufozonata*, Angas, Proc. Zool. Soc., London, 1877, p. 38, pl. v., fig. 13. *Type locality*—"Port Jackson."

This is the shell listed as *C. tincta*, Reeve, by Pritchard and Gatliff in Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii., p. 176, for Port Phillip.

Our species was submitted to Mr. Hedley, who wrote:—"Certainly not *C. tincta*, Reeve; see Hervier's discussion of that species, Jour. de Conch., vol. xlv., p. 90." I have not been able to consult this paper, so have preferred to retain the name by which the species was recorded in Adcock's list of the Aquatic Moll. of South Austr., 1893, No. 143.

*Guraleus*

**Mangilia mitralis**, Adams and Angas. 796

*Bela mitralis*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 420, No. 8. *Type locality*—"Port Jackson."

*Bela australis*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 420, No. 9; Angas *op cit.*, 1865, p. 159, "Aldinga and Rapid Bays,"

*Mangilia australis*, Adams and Angas, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 31; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "Tasmania, common."

*Mangilia mitralis*, Adams and Angas, Pritchard and Gatliff, Proc. Roy. Soc. Victoria, (1899) 1900, vol. xii., p. 173, "Victorian coast."

Taken on the beach Kangaroo Island; Pondolowie Bay, Spencer Gulf; Venus Bay and St. Francis Island, Great Australian Bight. I have not dredged it in South Australian waters; it would seem to be a specially littoral form.

*Guraleus*

**Mangilia tasmanica**, Tenison-Woods. 799

*Cithara tasmanica*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1875) 1876, p. 145. *Type locality*—"East coast of Tasmania."

*Mangilia tasmanica*, Tenison-Woods, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii., p. 175, "Port Fairy (Rev. T. Whan)"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369.

*Mangilia jacksoniensis*, Angas, Proc. Zool. Soc., London, 1877, p. 37, pl. 5, fig. 10. *Type locality*—"Off Port Jackson Heads in 25 fathoms (Brazier)."

*Daphnella jacksoniensis*, Angas, Tryon, Man. Conch., vol. vi., 1884, p. 311, pl. 22, fig. 73.

*Mangelia alternata*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1878) 1879, p. 39; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369.

Dredged in from 14 to 26 fathoms in Gulf St. Vincent and Investigator Strait; in Encounter Bay in about 5 fathoms (W. Reed). Taken on the beach of Banks Island, Spencer Gulf.

I think, probably, *M. tasmanica* grades from a long, narrow form with sharply-angulate whorls through *M. jacksoniensis*, and then through *M. mitralis* into *M. australis*, and forms one variable species.

*Conularia bellus* 780  
*Mangilia adcocki*, Sowerby.

*Mangilia adcocki*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 29, pl. iii., fig. 18; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, p. 174, "Western Port, etc."; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "North coast of Tasmania."

*Mangilia bella*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 419, pl. xxxvii., fig. 6 (*non* Hinds). Type locality—"Rapid Bay, St. Vincent Gulf."

Dredged in 14 and in 22 fathoms Investigator Strait and taken abundantly on the beach on Troubridge shoal, and of Antechamber Bay, Kangaroo Island.

Mr. Gatliff records its variations.

*Seriniun Mangilia gatliffi*, n. sp. Pl. xxviii., fig. 9. 772

Shell small, white, solid, shining, elongate-oval, blunt, of 5 whorls, including a protoconch of 2 smooth convex whorls, and a very flatly convex apex. Spire-whorls sloping convex. Suture distinct, subcanaliculate, undulating, margined. Body-whorl nearly as long as the spire, slightly attenuated at the base and truncate. Aperture oval, slightly narrowed behind, wide in front, notched, without a canal. Outer lip straightly convex, with a shallow, wide sinus behind, sharp, not inflected, smooth within. Inner lip narrow, smooth, applied, free at the front, with a callus posteriorly at the junction with the outer lip. Columella sub-concave, joining the body-whorl at a very open angle. Spiral sulcations equidistant, 9 in the penultimate, 17 in the body-whorl. Axial accremental striae, distinct under the microscope, cross the spirals, sinuous, comparatively distant, especially on the body-whorl.

Dim.—Length, 5·25 mm.; of aperture, 2·25 mm.; breadth, 2·25 mm.

Locality.—Type from 17 fathoms Backstairs Passage, with 2 others; Gulf St. Vincent, 3 good; in 15-20 fathoms

St. Francis Island, 3 quite fresh; 35 fathoms, 1 dead; 55 fathoms off Cape Borda, several dead; 110 fathoms off Beachport, 2 dead.

*Scrinium*

*Mangilia impendens*, n. sp. Pl. xxvii., fig. 3. 773

Shell solid, white, of 7 whorls, including the blunt protoconch of 2 smooth depressed convex turns. Spire-whorls sloping, swollen above the linear somewhat undulating suture, and barely swollen below it. Base slightly contracted. Aperture oblong-oval, narrower behind, widely open in front, with a shallow notch. Outer lip simple, sharp, thickened by a marked varix outside, which ascends roundly at the suture and bounds a shallow, wide posterior sinus, profile convex, barely sinused anteriorly. Axial costæ roundly trigonal, sinuous, undulating the upper suture, most valid at the swelling of the whorl, half as wide as the interspaces, vanishing towards the base, and becoming obsolete towards the aperture. Very crowded spiral incisions all over, and still finer sinuous axial growth scratches, finely granulating the surface.

*Dim.*—Length, 6·4 mm.; of body-whorl, 4·4 mm.; breadth, 2·5 mm.

*Locality*.—Type dredged in Gulf St. Vincent, with 23 others: 14 fathoms off Ardrossan, 1 alive; in 24 fathoms off Newland Head, 1 dead.

*Diagnosis*.—It approaches *M. hexagonalis*, Reeve, but this is a longer shell, with a sharp three-whorled brown protoconch, and with straighter, narrower ribs, and much more numerous spiral incisions.

*Mangilia hexagonalis*, Reeve.

*Pleurotoma hexagonalis*, Reeve, Proc. Zool. Soc., London, 1845, p. 118; also Conch. Icon., 1845, pl. xxxii., sp. 293. *Type locality*—“Philippines.”

*Mangilia hexagonalis*, Reeve, Tryon, Man. Conch., 1884, vol. vi., p. 251, pl. xx., figs. 1, 4; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 30, “Gulf St. Vincent.”

Dredged in 9, 10, 12, 14, and 20 fathoms in Gulf St. Vincent and Spencer Gulf, alive, rare. Taken on the beach at Aldinga (Kimber).

*Pseudorhaphitoma*

*Mangilia alticostata*, Sowerby. 779

*Mangilia alticostata*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 31, pl. iii., fig. 16. *Type locality*—“Gulf St. Vincent”; Hedley, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 17, “Port Jackson.”

Dredged in 12, 14, 15, and 20 fathoms in Gulf St. Vincent, rather rare; taken in Wallaroo Bay (Dr. Gosse); in

the Port Adelaide Creek (Tate). Dredged in 15 to 20 fathoms off St. Francis Island, 1 good; in 24 fathoms off Newland Head, 1 moderate; in 40 fathoms off Beachport, 1 moderate; in 55 fathoms off Cape Borda, 1 moderate; in 110 fathoms off Beachport, 2 very poor, and in 150 fathoms, 1 very poor.

*Exonella Mangilia (Glyphostoma) paucimaculata*, Angas. 776

*Glyphostoma paucimaculata*, Angas, Proc. Zool. Soc., London, 1880, p. 416, pl. xl., fig. 7. *Type locality*—"Aldinga and Holdfast Bays (Tate)"; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 30; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369, "Pirate's Bay, Tasmania."

Dredged in Gulf St. Vincent, alive, and in Spencer Gulf. Taken on the beach at Streaky Bay. A living individual, from 7 fathoms, dredged at the entrance to Eastern Cove, Kangaroo Island, supplied the following:—"The foot is nearly as long as the shell, narrow, truncated in front, pointed behind. A close and perfect examination revealed no operculum. The siphon is one-half the length of the foot. Minute tentacles are borne at the ends of stalks, twice as wide and four times as long as themselves. These are white, and a black eye occurs at the end of the stalk outside the base of the tentacle. The foot is variegated with translucent and opaque white, disposed in rings, and the upper part of the foot and body and siphon are ornamented with minute orange dots."

*Exonilus Mangilia spica*, Hedley. 811

*Mangilia spica*, Hedley, Records Austr. Mus., vol. vi., part 4, 1907, p. 297, pl. iv., fig. 20. *Type locality*—"80 fathoms off Narraabeen, New South Wales"; Hedley and May, *op. cit.*, vol. viii., 1908, p. 112, "100 fathoms off Cape Pillar, Tasmania."

One good example was dredged in 40 and in 110 fathoms off Beachport, and in 90 and in 130 fathoms off Cape Jaffa.

*Exonilus Mangilia dyscritos*, Verco. 808

*Terebra dyscritos*, Verco, Trans. Roy. Soc., South Australia, 1906, vol. xxx., p. 149, pl. iv., figs. 3, 4, 5.

Besides the localities given in the original description, it has been taken in 40 fathoms off Beachport, 5 quite fresh and 5 poor; in 55 fathoms off Cape Borda, 7 poor; and in 150 fathoms off Beachport, 4 poor. The largest specimen is 10 mm. long, and shows rusty axial flames, three in the body-whorl, and an obscure spiral of some four faint rusty blotches on the base, beginning at the middle of the inner lip. The generic and family location was doubtful when described, but the genus *Mangilia* among the Pleurotomidae seems the most appropriate place at present.

*Guraleus**Mangilia flaccida*, Pritchard and Gatliff.

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*Mangilia flaccida*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899, vol. xii., p. 102, pl. viii., figs. 3 and 4. *Type locality*—"San Remo, Western Port"; *ibid*, 1900, vol. xii., p. 175; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "Tasmania."

Dredged in Gulf St. Vincent, 1 perfect; in 40 fathoms off Beachport, 3 good; in 55 fathoms north-west of Cape Borda, 7 moderate. Taken on the beach at St. Francis Island, 8 good, and at LeHunte Bay, Great Australian Bight, 1 good. Identified by Mr. Gatliff.

*Guraleus, inc. colithiac* 803*Mangilia picta*, Adams and Angas.

*Mangilia picta*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 419, pl. xxxvii., fig. 7. *Type locality*—"Port Jackson (and South Australia)"; Angas, Proc. Zool. Soc., London, 1867; Tryon, Man. Conch., 1884, vol. vi., p. 256, pl. xxii., fig. 72; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 29; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1890, vol. xii. (N.S.), p. 173, "Victorian coast"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "Tasmania."

*Mangilia meredithia*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1875) 1876, p. 142. *Type locality*—"Bass Strait."

The variations of this species make it very worrying. The typical shell is easily recognized by its colour bands, its bold ribs, and its fine spiral incisions; but the ribs may diminish to the vanishing point, the shape may vary to a short, broad form or to a long, narrow shell, and the angulation may become a rounded shoulder.

The colour markings may disappear in turn, till the shell is quite white, or may become narrow and numerous, so as to band the whole body-whorl with thin brown lines, and approach *M. insculpta*, Adams and Angas, from which the brown apex and the more decided incisions of the latter distinguish it. The most persistent ornament is that referred to by Mr. Gatliff, the colour dashes immediately below the suture, which are frequently crescentic and correspond with the contour of the sinus. Another variation is a colouration of the lower half only of the base of the body-whorl.

Dredged from 8 to 22 fathoms in Gulf St. Vincent and Spencer Gulf, and off St. Francis Island; also good in 110 fathoms off Beachport, and moderate in 200 fathoms. Taken all along the coastline westward to Fowler Bay.

*Guraleus**Mangilia insculpta* Adams and Angas.

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*Mangilia insculpta*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 420, pl. xxxvii., fig. 8. *Type locality*—"Gulf St. Vincent"; Angas, *op. cit.*, 1865, p. 160; Tryon, Man. Conch., 1884, vol. vi., p. 256, pl. xxii., fig. 61.

Dredged in 15 and in 20 fathoms Gulf St. Vincent, Investigator Strait, and Backstairs Passage, several; in 62 fathoms north-west of Cape Borda, 4 immature and poor. Taken on the beach at Sceales Bay and St. Francis Island.

As Mr. May writes:—"It is closely related to *M. delicatula*, Tenison-Woods, in shape, but the latter has more pronounced ribs and spirals, especially on the body-whorl."

*Geralius*

*Mangilia delicatulus* Tenison-Woods. 192

*Mangilia delicatula*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1878) 1879, p. 37. *Type locality*—"Long Bay, Tasmania"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369, pl. xxiv., fig. 35; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1907, vol. xx., p. 31, "6 to 8 fathoms Western Port."

*Daphnella delicatula*, Tenison-Woods, Tryon, Man. Conch., 1884, vol. vi., p. 302, pl. xxxii., fig. 29.

Dredged in 6 fathoms off St. Francis Island, 3 good, and in Gulf St. Vincent, 6 good. Taken on the beach at Aldinga (Mr. Kimber).

Mr. May confirmed my identification. The shell may be long and narrow to short and ventricose; the whole surface may be yellowish-brown, or the anterior half of the body-whorl may be light-brown, or there may be a white band just above the shoulder of the body-whorl. Tate and May give *M. cuspis*, Sowerby, as a synonym, but this is allied rather to *M. letourneuxiana*, Crosse.

*Geralius* *Mangilia connectens*, Sowerby. 185

*Mangilia connectens*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 30, pl. iii., fig. 14. *Type locality*—"Gulf St. Vincent."

Dredged in 14 fathoms off Ardrossan, 4 very good; in 20 fathoms Gulf St. Vincent, 1 alive, 1 good; in 15 to 20 fathoms off St. Francis Island, 3 dead; in 55 fathoms north-west of Cape Borda, 8 moderate.

*Geralius* *Mangilia vincentina* Crosse and Fischer. 193

*Mangilia vincentina*, Crosse and Fischer, Journ. de Conch., 1865, vol. xiii., p. 422, pl. xi., fig. 6. *Type locality*—"Rapid Bay, Gulf St. Vincent"; Angas, Proc. Zool. Soc., London, 1865, p. 160; also 1877, p. 185, "dredged off Port Jackson Heads," etc.; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii. (N.S.), p. 174, "Victoria"; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 30.

*Mangilia vincentiana*, Crosse, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369, "King Island, Tasmania."

*Daphnella vincentina*, Crosse, Tryon, Man. Conch., 1884, vol. vi., p. 311, pl. xvii., fig. 91.

*Mangilia alucinans*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 29, pl. iii., fig. 12. *Type locality*—"Yankalilla Bay"; var. *ornata*, Sowerby, loc. cit., pl. iii., fig. 13; Pritchard and Gatliff, op. cit. *supra*, p. 175, "Victorian coast"; Tate and May, loc. cit. *supra*, "Long Bay, Tasmania."

Mr. Sowerby says of *M. alucinans*:—"Shells of this species have been mistaken for *M. vincentina*, Crosse, and also for *M. lineata*, Reeve. The type of the former is a little plain brown shell, with very obscure bands of darker brown. It is more sharply angular, and the ribs are thinner than in *M. alucinans*."

Mr. Angas in P.Z.S., 1877, p. 185, records *M. vincentina* for New South Wales, and remarks:—"The figure given in the French Journal of this species is so bad, no one could recognize it. The shell is white, with a row of brown spots between the ribs a little below the sutures, and sometimes with a central band on the last whorl. Crosse figures it of a uniform brown colour." This figure seems to have excusably misled Mr. Sowerby as to the appearance of Crosse's type, and he calls it "a little plain brown shell." Crosse describes his shell as "lutescens," and Sowerby his as "straminea," both equal to "yellowish"; Angas says the former is white, and Sowerby says of the latter, "Some are nearly white." As to *M. vincentina* being a little shell, it is really described as 7 mm. long, which is half a millimetre longer than *M. alucinans*. Angas recognized Port Jackson shells as the species he had sent to Crosse from South Australia, and examples sent me from New South Wales by Mr. Hedley as *M. vincentina* are identical with the type and cotypes of *M. alucinans* returned to me by Mr. Sowerby. The type localities of the two species are practically the same, Rapid Bay and Yankalilla Bay being adjacent to each other in Gulf St. Vincent; and it is significant, too, that Mr. Sowerby says, "Among all the South Australian shells I have examined, none are quite conformable to Crosse's type of this species," and yet Angas and I dredged our specimens in almost the same spot.

In the collection of the late Professor Tate, which came into my possession, was a tray with rather more than 200 shells labelled *Mangelia vincentina*, St. Vincent Gulf. Of these nearly one-half were like Sowerby's type of *M. alucinans*, and the remainder were the stouter, more coloured form approaching his variety *ornata*. Angas in P.Z.S., London, 1880, p. 415, begins a paper thus:—"Several months ago I received from Professor Ralph Tate, of the Adelaide University, a small collection of marine shells obtained by him (mostly from shell-sand) on various beaches in St. Vin-

cent and Spencer Gulfs." It is most probable Mr. Angas was responsible for the identification of the examples from which Professor Tate named the specimens in his cabinet. There can be little doubt, therefore, that Mr. Angas and Professor Tate regarded as *M. vincentina*, Crosse, both the forms which Mr. Sowerby has described as *alucinans*.

An examination of the type and cotypes received from Mr. Sowerby, as well as many fresh dredged and beach specimens since obtained, lead to the conclusion that *M. alucinans*, Sowerby, is conspecific with *M. vincentina*, Crosse, and may be retained to indicate a variant in which the ribs are rounder and more solid, and the spiral liræ are finer and more crowded.

The species is very variable. With the same number of whorls some adults may be twice as long as others, and when of equal length may differ much in breadth and greatly in solidity. There may be only twelve prominent spirals over the body-whorl from the angulation to the notch, and between each of these there may be as many as twenty crowded striæ, or only six. Sometimes there are twenty equal prominent threads, with fewer threadlets intervening. The striæ between the primary spirals may be all of equal size, or of three distinct sizes; secondary ones in the middle of the spaces, tertiary between them, and very fine between these. In some cases the primaries may be not marked, and in others absent, the spirals being all equal or nearly so. Nearly all these differences may be found among the cotypes themselves.

As to colour markings, the boldest, most frequent, and persistent is the spiral row above the angle, with the transverse spots in the intercostal spaces. Next one in the middle of the body-whorl, then one between this and the snout, then one between the latter two, and then one between the former two. All these below the angle are on the ribs, and interrupted by the spaces; except in a very few examples, when they form a continuous spiral line, distinctly thinner in the interspaces. Rarely some individuals are also minutely dotted with brown all over the whorls, but most abundantly just below the sutures, and the intercostal spaces below the lowest spiral may have short-curved axial brown flames.

Dredged alive in Gulf St. Vincent from 5 to 22 fathoms, many alive; in 15 to 35 fathoms St. Francis Island, several; in 45 fathoms off Neptune Islands, 4 fresh; in 55 fathoms off Cape Borda, 19 moderate; in 62 fathoms, 11 moderate; in 90 fathoms off Cape Jaffa, 1 poor; and in 110 fathoms off Beachport, 1 poor. Taken on the beach as far west

as St. Francis Island and LeHunte Bay. The beach specimens are usually larger, and more solid and more fully coloured than the dredged shells. It affects the shallower waters.

*Nacteola*

*Mangilia anomala*, Angas.

802

*Purpura (Cronia) anomala*, Angas, Proc. Zool. Soc., London, 1877, p. 34, pl. v., fig. 1. *Type locality*—"25 fathoms outside Port Jackson Heads"; also 1880, p. 415, "South Australia"; Tryon, Man. Conch., 1884, vol. vi., p. 318.

*Murex (Ocenebra) anomala*, Angas, Tyron, Man. Conch., 1880, vol. ii., pp. 121 and 180, pl. xxxvi., fig. 422.

*Mangilia anomala*, Angas, Tate, Proc. Linn. Soc., New South Wales, 1890, vol. v., p. 131; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 31; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii. (N.S.), p. 174, "Victorian coast"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 369, "North coast Tasmania."

Dredged alive in 5 fathoms Gulf St. Vincent, 1; in 15 to 20 fathoms off St. Francis Island, 2; in 20 fathoms outside Backstairs Passage, 2; dead at various depths up to 22 fathoms in Gulf St. Vincent and Spencer Gulf; in 55 fathoms off Cape Borda, 1 very poor. Taken on the beach as far west as Sceales Bay. It appears not to live beyond about 25 fathoms.

*variolosa*

*Mangilia fallaciostis* Sowerby.

786

*Daphnella (?) fallaciosa*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 26, pl. iii., fig. 7. *Type locality*—"Gulf St. Vincent (Verco)."

The author says:—"It is with some uncertainty that I place this with *Daphnella*." The type was immature, with the labrum thin; when adult this has quite a marked varicose thickening close to its border, though the individual may measure only 6·7 mm. instead of the typical 10 mm. The shells may be more solid and opaque than the type, though usually they are rather thin and diaphanous. Instead of the typical feeble sinuous axial plicæ on the upper three spire whorls only, which become obsolete on the fourth, these may be quite valid on four whorls, and to the border of the labrum, fading out on the base of the whorl. The protoconch, when the shell is alive or quite fresh, may be translucent white or brown, and large irregular rusty flames, blotches, and streaks may colour the shell.

Dredged in 15-20 fathoms off St. Francis Island, 2 good; in Gulf St. Vincent, 13 quite fresh or alive; in 40 fathoms off Beachport, 5 good; in 45 fathoms off the Neptune Islands, 3 good; in 55 fathoms off Cape Borda, 5 good; in 62 fathoms, 5 good; in 90 fathoms off Cape Jaffa, 18 moderate; in 110

fathoms off Beachport, 22 good; in 130 fathoms off Cape Jaffa, 1 very good; in 150 fathoms off Beachport, 9 good, showing the brown flames; in 200 fathoms off Beachport, 11 good; in 300 fathoms off Cape Jaffa, 9 very poor.

**Daphnella brenchleyi**,—Angas.

*Clathurella brenchleyi*, Angas, Proc. Zool. Soc., London, 1877, p. 37, pl. v., fig. 12. *Type locality*—"Port Stephens."

*Daphnella brenchleyi*, Angas, Hedley, Memoirs Austr. Mus., iv., part 6, 1903, p. 391, fig. text 106, "41-50 fathoms off Cape Three Points, New South Wales."

*Cooperdaphne vercoi*, Sowerby. 827

*Daphnella vercoi*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 27, pl. iii., fig. 8. *Type locality*—"Backstairs Passage, 6 to 20 fathoms."

The type shell of this species is much more ventricose and comparatively of more delicate texture than *C. brenchleyi* from New South Wales, but shells returned to me by Mr. Sowerby as cotypes are indistinguishable from the New South Wales form in shape and sculpture, and have the same minutely spirally lirate protoconch, and grade into his type. I am compelled, therefore, to unite the two.

Dredged in 6, 9, 12, 15, 17, 20, and 22 fathoms in Gulf St. Vincent and Spencer Gulf, Investigator Strait, and Backstairs Passage.

*Galfridus Daphnella eburneus* Petterd.

*Trophon eburneus*, Petterd, Jour. Conch., 1884, vol. iv., p. 142. *Type locality*—"Tamar Heads"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1897) 1898, vol. x. (N.S.), p. 258, "Western Port"; also *op cit.*, (1905) 1906, vol. xviii. (N.S.), p. 41.

*Tritonidea eburnea*, Petterd, Adcock, Handlist of Aquatic Moll. of South Australia, 1893, p. 4, No. 48.

*Cantharus eburneus*, Petterd, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 357, text fig. 1.

Tate and May shifted this species from *Trophon* to *Cantharus*, but Pritchard and Gatliff objected to this location, yet felt doubt as to where it should be placed. I now suggest *Daphnella*. It has a closely spirally lirate protoconch like several species in this genus, the delicate lamelliform axials, which make a frill immediately below the suture, corresponding with a small round sinus there, and has fine, crowded spirals, and when alive is of delicate texture and comes close to *Daphnella brenchleyi*, and especially to var. *vercoi*, Sowerby. The objection urged to its location in *Cantharus*, which might be regarded as equally valid here, is its umbilicus; but is it not a false umbilicus? It is absent from young shells,

and is only a separation of the inner lip at its tip, from the sinistral twist of the extremity of the columella.

Dredged in 17 fathoms Backstairs Passage, 4 dead, moderate. Taken on the beach at Aldinga and at Fowler Bay, and on St. Francis Island.

**Daphnella diluta**, Sowerby. 805

*Daphnella diluta*, Sowerby, Proc. Mal. Soc., London, vol. 2, 1896, p. 26, pl. iii., fig. 6. *Type locality*—"Backstairs Passage, 20 fathoms (Verco)."

Dredged in Backstairs Passage, 17 fathoms, 4 dead; in 20 fathoms, 2 fresh, 8 dead; in 22 fathoms, 1 alive, 3 fresh, 4 dead; in Gulf St. Vincent, depth unrecorded, 6 moderate; in 55 fathoms off Cape Borda, 1 broken.

*Euvalous Daphnella inornata* Sowerby. 790

*Mangibla inornata*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 30, pl. iii., fig. 15. *Type locality*—"Gulf St. Vincent."

Dredged alive in 22 fathoms Backstairs Passage; also many alive or dead in 15, 17, and 20 fathoms in Gulf St. Vincent; in 62 fathoms north-west off Cape Borda, 1 perfect, 2 good immature; in 90 fathoms off Cape Jaffa, 1 dead; in 110 fathoms off Beachport, 5 good.

I think this is a *Daphnella* from its light texture, fine cancellation, and sinus.

*Exomiles*

**Daphnella fenestrata** n. sp. Pl. xxviii., figs. 6 and 7. 809

Shell delicate, white, of 5 whorls, including a rather blunt scarcely mamillate protoconch of 2 convex whorls, with 7 spiral liræ, ending abruptly at the first axial rib. Spire-whorls gradate, subconcavely sloping below the suture, with a sharp lira at the edge of the gradation: whorls contracting towards the lower suture; body-whorl contracted at the base; canal very short; aperture oblong-oval, outer lip thin, with ten liræ outside, which with the lip in profile project as minute spurs; sinus well marked from the suture to the angle; inner lip a narrow, opaque-white glaze: columella long, straightly convex. Sculpture bold, five spirals in the first and second whorls, including that at the angle, fourteen on the body-whorl, narrow, erect; axials, twenty in the penultimate, corona-tating the uppermost spiral with projecting points, and producing tiny tubercles as they cross the other spirals. Crowded axial threads, concave forwards, run from the simple suture to the angle.

Dim.—Length, 4 mm.; of the body-whorl, 2·8 mm.; breadth, 1·5 mm.

*Locality.*—Type in 62 fathoms north-west of Cape Borda, 10 good; in 90 fathoms off Cape Jaffa, 17 good and broken; in 104 fathoms 35 miles south-west of Neptune Islands, 3 good, 7 fragments; in 110 fathoms off Beachport, 6 good; and in 130 fathoms off Cape Jaffa, 2 good.

*Variations.*—There may be only three spirals in each spire-whorl, with less numerous axials. It may reach 6·5 mm. in length.

### Daphnella fragilis, Reeve.

*Pleurotoma fragilis*, Reeve, Proc. Zool. Soc., London, 1845, p. 111, "Habitat—(?)" ; Conch. Icon., 1845, pl. xxi., sp. 179; Angas, Proc. Zool. Soc., London, 1880, p. 416, "Aldinga Bay (Tato)" ; Sowerby, Proc. Mal. Soc., London, 1890, p. 26, No. 10; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), part 2, p. 51, "Western Port, Victoria, 7 fathoms."

*Pleurotoma lymneiformis*, Kiener, Reeve, Conch. Icon., 1846, pl. xxxv., fig. 325.

*Pleurotoma lymneiformis*, Kiener, Coq. Vivantes, p. 62, pl. xxii., fig. 3; var. *fragilis*, Reeve, Tryon, Man. Conch., 1884, vol. vi., p. 300, pl. xxvi., fig. 90.

Dredged at all depths from 9 to 20 fathoms: 3 from Newland Head, westward as far as St. Francis Island, but not in deeper water.

### 806 Daphnella stiphra, n. sp. Pl. xxv., figs. 5 and 6.

Shell fragile, short, biconic. Protoconch brown, of  $4\frac{1}{2}$  whorls, the apical  $1\frac{1}{2}$  with close spiral liræ, punctate between, the rest latticed by the crossing of two sets of crowded oblique liræ, whorls convex, sutures deep. Spire-whorls four, convex, roundly angled just below the centre; sutures deep. Body-whorl tumid, contracted at the base; aperture obliquely oval: outer lip thin, simple, broken; inner lip represented by a smooth, glazed area; columella straight, barely concave; canal short, open. Sinus at the suture, round, simple.

*Sculpture.*—In the concave space just below the suture are crowded very fine spirals, eight in the penultimate; below a prominent thread which bounds this space are more distant and stouter liræ, two in the first whorl, three in the second, four in the third, eight in the fourth, and about forty in the body-whorl. Axial threadlets concave forwards to the prominent spiral thread, and convex forwards thence to the suture, run in the body-whorl over the base to the canal.

*Dim.*—Length, 8·5 mm.; breadth, 4 mm.

*Locality.*—Type 300 fathoms off Cape Jaffa, dead; in 15 fathoms off Wallaroo, 1 moderate.

*Asper daphne*

**Daphnella perplexa**, n. sp. Pl. xxviii., figs. 1 and 2. 825-

Shell delicate, elongate-oval, of 6 whorls. Protoconch of two convex whorls, each with ten valid spiral liræ; apex blunt, ending abruptly, with the first spire-whorl issuing from within it. Spire-whorls four, convex, sutures linear. Body-whorl much longer than the spire, gradually contracting at the base. Aperture oblique, elongate-oval, canal short, wide, open, deviated slightly to the left. Columella straight, forming an obtuse angle with the inner lip, which is distinct, complete, applied, and glazed. Outer lip with a finely crenulated border; in profile retrocurrent at the suture to form a shallow sinus, then uniformly curved, convex, with a shallow excavation at the contracted base. The whole surface of the shell is sculptured with spiral liræ, six in the first whorl, twelve in the second, sixteen in the third, and fifty-two in the body-whorl, granulated by very fine axial striae which granulate the sutural margin. Colour is somewhat mottled very light-brown, with spiral equidistant white hairlines, five in the penultimate, ten in the body-whorl.

*Dim.*—Length, 6·3 mm.: of body-whorl, 3·9 mm.; width, 2·2 mm.

*Locality*—Type 22 fathoms Backstairs Passage; off Point Marsden, Kangaroo Island, 15 fathoms, 1 dead: Yankalilla Bay and Gulf St. Vincent, depth unrecorded, 10.

*D. fragilis*, Reeve, has its protoconch latticed by crossing liræ, has a different shape, and wider-spaced stronger axials.

The length when adult, shown by the ascending suture, may be 4·7 mm. or 7·1. The colour may be wholly white, probably from bleaching.

*Asper daphne*

**Daphnella legrandi**, Beddome.

823

*Drillia legrandi*, Beddome, Proc. Roy. Soc., Tasmania, (1882) 1883, p. 167. *Type locality*—“D’Entrecasteaux Channel, 7 fathoms.”

*Clathurella legrandi*, Beddome, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii. (N.S.), p. 178, “Portland”; Hedley, Proc. Linn. Soc., New South Wales, 1900, p. 225, pl. xxv., figs. 1, 2, 3.

Tate and May, in Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 371, make it a synonym of *Clathurella sculptilior*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1878) 1879, p. 38. Two gentlemen claim to have provided the author with the type and to possess the cotypes. One presents examples of *D. legrandi* as the cotypes; the other, who is cited by Woods as having supplied the type, distributes *C. desalesi*, Tenison-Woods. The weight of evidence is in favour

of the latter, and *D. legrandi* can scarcely be accepted. As the type cannot be found, and the shell has not been figured, it is preferable to ignore *C. sculptilior* and use the two names which are certain for the two species. Tate and May are followed by Hedley in Records Austr. Mus., vol. vi., part 4, p. 298, 1907, who calls the shell *Daphnella sculptilior* [sic], Tenison-Woods.

Tate and May also make *Daphnella bitorquata*, Sowerby, a synonym of this shell (Proc. Linn. Soc., New South Wales, 1901, xxvi., p. 446), but it is really a variety of *Daphnella tasmanica*, Tenison-Woods.

Dredged at varying depths in Gulf St. Vincent and Backstairs Passage up to 20 fathoms, 30 dead and quite fresh: in 15 to 20 fathoms off St. Francis Island, 4 moderate, and in 35 fathoms, 1 moderate: in 40 fathoms off Beachport, 1 good and 4 poor; in 55 fathoms off Cape Borda, 4 poor; in 110 fathoms off Beachport, 5 moderate.

~~Daphnella~~ ***Daphnella bastowi***, Gatliff and Gabriel. 821

*Daphnella bastowi*, Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (N.S.), p. 365, pl. xxi., figs. 1 to 4. *Type locality*—“Western Port.”

Dredged in Gulf St. Vincent, depth unrecorded, 7 examples.

~~Daphnella~~ ***Daphnella tasmanica***, Tenison-Woods. 826

*Daphnella tasmanica*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 138, “Tasmania”; Hedley, Proc. Linn. Soc., New South Wales, (1901) 1900, vol. xxiv., p. 725, fig. 21, and xxvi., (1901) 1902, p. 700; Tate and May, Proc. Linn. Soc., New South Wales, xxvi., 1901, p. 372; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1905) 1906, vol. xviii. (N.S.), part 2, p. 52, “Western Port, about 7 fathoms.”

~~Daphnella~~ ***bitorquata***, Sowerby, Proc. Mal. Soc., London, vol. ii., 1896, p. 27, pl. iii., fig. 10, “Spence and St. Vincent Gulfs (Adcock).”

This shell varies greatly—(1) In shape. The whorls may be quite round, or uniangulate or biangulate, depending on the strength of certain spirals. Some examples are much shorter and more ventricose than others: (2) in sculpture. The spirals may be nearly equal all over the shell, or unequal on the early whorls and equal on the body-whorl, or they may be alternately markedly large and small. The axials in some are as distant as the spirals, so as to make a square, open lattice, or very crowded, and this either on shells with equal and close or unequal and open spirals. In some the large spirals are nodulated, so that the shell, looked at from the apex, displays some ten or twelve angles, which may be opaque-white; (3) in colour. The shell may be uniformly

brown, or with square, distant brown blotches below the sutures, or more or less indistinctly mottled with brown, and with opaque white spots scattered about.

Dredged in Gulf St. Vincent at depths up to 23 fathoms, 14 alive or good; in 20 fathoms off Newland Head, 1 good; in 35 fathoms off St. Francis Island, 1 good. The South Australian shells favour the *bitorquata* variety rather than the typical *D. tasmanica*.

*Nepotilla Daphnella lamellosa*, Sowerby. 816

*Clathurella lamellosa*, Sowerby, Proc. Mal. Soc., London, 1896, vol. 2, p. 28, pl. iii., fig. 11. Type locality—"Gulf St. Vincent (Veroe)": Hedley, Proc. Linn. Soc., New South Wales, 1900, vol. xxv., p. 725.

Mr. Hedley, *loc. cit.*, supposes it to be an immature *Daphnella tasmanica*, Tenison-Woods, but the shape of the labral sinus is quite distinctive.

Dredged in Gulf St. Vincent up to 22 fathoms, several alive and dead; in 15 to 20 fathoms off St. Francis Island, 1 dead; in 90 fathoms off Cape Jaffa, 2 perfect; in 104 fathoms 35 miles south-west of the Neptunes, 42 good and broken; in 110 fathoms off Beachport, 1; and in 130 fathoms off Cape Jaffa, 1 dead.

*Nepotilla Daphnella triseriata*, n. sp. Pl. xxviii., fig. 8. 820

Shell of 6 whorls, including the protoconch of 2 whorls, with an exsert apex, closely spirally lirate. When viewed from the apex, the contour of the spire-whorls is not uniformly curved, but polygonal, septangulate in the type. They have a central angulation, provided with a stout, rounded cord, and are constricted at the linear sutures. In the first and second spire-whorls a smaller secondary lira arises above the angle and another below; in the third whorl another tertiary and still smaller lira is intercalated above, and another in each interval below. In the body-whorl, below these, arising at the suture is a stout cord forming a second angulation, below which the base is markedly concavely constricted, and has about ten liræ, diminishing in size anteriorly. The aperture is obliquely oval, narrowed behind. Columella straightly convex. Outer lip thin, simple, crenulated, and toothed by the spirals; with a deep, narrow posterior sinus, bounded on one side by the sutural lira, and on the other by the nearest secondary lira; in profile the lip is convex. Very fine crowded axial striae, corresponding with the sinuosity of the outer lip, cross the whole surface except the primary spirals.

*Dim.*—Length, 4·6 mm.; of the body-whorl, 2·4 mm.; breadth, 2·4 mm.

*Locality.*—Type 110 fathoms off Beachport, with 6 others, good; in 130 fathoms off Cape Jaffa, 3 very good, and in 90 fathoms, 6 good, but small.

*Nepotilla* 813 ***Daphnella bathentoma*, n. sp.** Pl. xxviii., fig. 381.3

Shell small, white, thin, of 5 whorls, including the prominent conical protoconch of 2 convex ciate whorls, with exserted apex. Spire-whorls have a corded obtuse angulation, with a slope from the upper suture, somewhat constricted towards the lower. Body-whorl with a second angulation starting from the suture at the aperture; below this the base is rapidly concavely contracted. Aperture obliquely oval. Canal short. Outer lip thin, simple, biangulate; with a deep, narrow sinus at the suture with parallel margins; in profile slightly convex to the front angulation, then concave to the edge of the canal. Columella very long, nearly straight. When looked at from the apex the shell is faintly polygonal, with ten angles in a spiral (in a cotype these are produced into transverse sharp tubercles). A single spiral runs between the angulation and the upper suture, and in the body-whorl bounds the front of the posterior sinus. Another lies midway between the angulation and the lower suture. In the suture, the second angulation of the body-whorl may appear as a sutural cord. This bounds the back of the posterior labral sinus. Axials concave forward run from the suture to the nearest spiral, then straight and very obliquely from this to the first angle, then vertically to the next angle, and are lost on the base; they do not cross the spirals or stand erect.

*Dim.*—Length, 2·8 mm.; of the body-whorl, 1·8 mm.; breadth, 1·45 mm.

*Locality.*—Type from 104 fathoms 35 miles south-west of Neptune Islands, with 10 others good, all dead.

*Nepotilla* ***Daphnella minuta*, Tenison-Woods.** 817

*Drillia minuta*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 136. *Type locality*—“Long Bay, Tasmania.”

*Daphnella minuta*, Tenison-Woods, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 372.

*Daphnella (Teres) mimica*, Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 27, pl. iii., fig. 10. *Type locality*—“Gulf St. Vincent (Verco)”; also var. *fusca*, loc. cit.

*Daphnella mimica*, Sowerby, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1905) 1906, vol. xviii., part 2, p. 52, “Western Port, about 7 fathoms.”

Dredged in Gulf St. Vincent, under 22 fathoms, 20 alive, 9 dead: in 17 fathoms Backstairs Passage, 1 alive; in 15-20 fathoms off St. Francis Island, 1 alive; in 35 fathoms, 1 alive, 2 dead; in 45 fathoms off Neptune Islands, 1 dead; in 90 fathoms off Cape Jaffa, 2 dead, immature; in 104 fathoms 35 miles south-west of Neptune Islands, 2 good, dead.

Another variety which may be called *marmorata* is beautifully marbled with flames of white and deep blackish-brown.

### *Nepotilla Daphnella excavata*, Gatliff. 814

*Daphnella excavata*, Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xix. (N.S.), p. 1, pl. i., figs. 1 and 2. *Type locality*—"Port Phillip"; Hedley, Proc. Linn. Soc., New South Wales, 1907, vol. xxxii., p. 507, "in 17-20 fathoms off Mast Head Island, Queensland"; Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 112, "in 100 fathoms off Cape Pillar, Tasmania."

Dredged in 22 fathoms outside Backstairs Passage, 11 examples. Identified by Mr. Gatliff.

### *GURALEUS varix* *Cythara compta*, Adams and Angas. 781

*Cithara compta*, Adams and Angas, Proc. Zool. Soc., London, 1863, p. 419, pl. xxxvii., fig. 5. *Type locality*—"New South Wales"; 1865, p. 160, "dredged Rapid Bay, Gulf St. Vincent"; 1867, p. 204; Sowerby, Proc. Mal. Soc., London, 1896, vol. ii., p. 31; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, (1899) 1900, vol. xii. (N.S.), p. 176, "Victoria"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370, "Tasmania."

*Daphnella*, etc., Tryon, Man. Conch., 1884, vol. vi., p. 306, pl. xxv., fig. 49.

*C. Daphnella varix*, Tenison-Woods, Proc. Roy. Soc., Tasmania, (1876) 1877, p. 10. *Type locality*—"Tamar Heads, Tasmania."

Dredged alive at all depths from 9 to 20 fathoms in Gulf St. Vincent and Spencer Gulf, and in our two Straits; only 1, and that very poor, dredged in 40 fathoms off Beachport. It is taken on the beach on St. Francis Island, and has been sent to me from Rotnest Island, in Western Australia. It is a comparatively common shell in South Australia.

### *Guraleus Cythara kingensis*, Petterd. 793

*Daphnella kingensis*, Petterd, Jour. Conch., 1879, vol. ii., p. 102. *Type locality*—"King Island, Tasmania"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 370; Hedley and May, Records Austr. Mus., vol. vii., No. 2, 1908, p. 112, "100 fathoms off Cape Pillar, Tasmania."

*Cithara cognata*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899, vol. xii., p. 103, pl. viii. *Type locality*—"5 fathoms Western Port"; Tate and May, loc. cit., affirm its identity.

*Mangilia emina*, Hedley, Records Austr. Mus. vol. vi., part 2, 1905, p. 53, fig. 20. *Type locality*—"111 fathoms off Cape Byron, New South Wales."

Mr. Hedley, who has seen my series, regards his type as a micromorph of *C. kingensis*, and withdraws his species.

It is very variable. It may be 16 mm. long, as in the type of *C. cognata*, 11 mm. as in *M. emina*, or 5·75 mm. as in some adult examples of mine. In shape it may be long and narrow, or short and broad. In sculpture it may have axial ribs, well marked, narrow, almost lamelliform, or round and solid, or low, or quite obsolete, especially on the body-whorl. The spiral liræ may be quite valid, or revealed only by a fairly high power of the microscope; generally the spirals are best marked when the axials are small. The colour may be a uniform brown tint, or there may be spiral colour bands of different widths, or the shell may be white.

Dredged in 15-20 fathoms off St. Francis Island, 1 nearly adult; in 40 fathoms off Beachport, 11 good; 55 fathoms north-west of Cape Borda, 1 good, 2 poor; in 90 fathoms off Cape Jaffa, 2 immature; in 104 fathoms 35 miles off the Neptunes, 19 good, 35 immature; in 110 fathoms off Beachport, 2 good, 3 moderate; in 130 fathoms off Cape Jaffa, 5 perfect, 5 immature; in 150 fathoms off Beachport, 3 moderate; in 200 fathoms, 6 good, 4 poor; in 300 fathoms off Cape Jaffa, 4 immature. It appears not to inhabit our shallower waters, but to be fairly evenly distributed, though rare from 40 to 300 fathoms.

### *Borsonia ceroplasta*, Watson. 452

*Borsonia ceroplasta*, Watson, Chall. Reps. Zool., 1886, vol. xv., p. 368, pl. xviii., fig. 2, "North of Culebra Island, West Indies, 390 fathoms, Pteropod ooze."

Dredged in 300 fathoms off Cape Jaffa, 1 dead shell. It differs from the type in that its spire is proportionally not quite so long, and no obsolete flat spirals are visible above the suture and winding round the base. The nucleus, suture, infrasutural pad, angulation, tubercles, generic fold on the columella, canal, labral sinus (as well as can be determined from the description and figure) are identical. As only one specimen has been taken, and this immature, of six whorls only instead of eight, and a dead though well-preserved example, and as the members of the Pleurotomidae show very wide specific variations, it is probably only a variant, and is provisionally so recorded. This is a new genus for South Australia.

### *Mitromorpha alba*, Petterd.

*Columbella alba*, Petterd, Jour. Conch., vol. ii., 1879, p. 104. Type locality—"Blackman's Bay, Tasmania."

*Mitromorpha alba*, Petterd, Tate, Proc. Roy. Soc., New South Wales, 1898, p. 397; Tate and May, Proc. Linn. Soc., New South

Wales, 1901, vol. xxvi., pp. 372 and 455; Hedley, *op. cit.*, 1905, vol. xxx., p. 534; Records of the Austr. Mus., vol. vi., part 4, p. 298, "80 fathoms off Narrabeen."

*M. flindersi*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, vol. xii. (N.S.), p. 104, pl. viii., fig. 6, "Western Port"; *op. cit.*, vol. xviii., 1905, p. 51.

Dredged in Gulf St. Vincent, 16 good and moderate; in 40 fathoms off Beachport, 10 good, 4 moderate; in 55 fathoms off Cape Borda, 3 perfect, 17 good; in 60 fathoms off Cape Borda, 8 very poor; in 90 fathoms off Cape Jaffa, 2 very poor; in 110 fathoms off Beachport, 3 very good, 12 poor; in 130 fathoms off Cape Jaffa, 1 good, 8 very poor; in 200 fathoms off Beachport, 1 poor. It would seem to live up to about 110 fathoms. Taken on the beach St. Francis Island, good.

Some shells are much more solid and ventricose than others.

### *MITRITHARA* 453

#### *Mitromorpha alba*, Petterd. *Luc. axiscalpta*, var. nov.

It has the shape of *M. alba*, Petterd, but has crowded axial incisions granulating the spirals. It has also three spiral rows of small, square brown spots on the body-whorl; one just below the suture, but not on the first spiral as in some of the typical *M. alba*; a second starting just above the aperture and winding round to just above the middle of the labrum; a third beginning just above the two nodules on the labium and running over the back of the snout. The upper two rows appear in the spire-whorls. Sometimes the shell is flamed with very light-brown between the spots axially.

Dredged in Gulf St. Vincent, 10 good, 2 poor; in 55 fathoms off Cape Borda, 10 good, 37 poor; in 110 fathoms off Beachport, 6 poor.

#### *Mitromorpha angusta*, n. sp. Pl. xxvii., figs. 4 and 5. 455

Shell fusiform, narrow, of 6 whorls, including the protoconch of 2 smooth convex whorls, with simple suture. Spire-whorls convex, with simple suture; body-whorl tapering anteriorly. Aperture narrowly oval, scarcely contracted behind, widely open in front, no canal, only channelled; outer lip thin, simple, uniformly convex in profile, no distinct sinus posteriorly; inner lip slightly thickened on the straight columella, with two faint plaits or nodules. Colour white, with a spiral row of some seven brown spots, showing just above the suture, and winding to the middle of the labrum.

Dim.—Length, 5·7 mm.; of the body-whorl, 3·8 mm.; breadth, 2·1 mm.

*Locality*.—Type from 110 fathoms off Beachport, with 3 others very good; in 55 fathoms off Cape Borda, 3 good; in 200 fathoms off Beachport, 1 good.

It is much more attenuate than *M. alba*, Petterd, and has only the one suprasutural row of spots. It may possibly be an extreme variant.

*Mitromorpha incerta*, Pritchard and Gatliff. 76

*Mangilia incerta*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902, vol. xiv. (N.S.), part 2, p. 181, pl. ix., fig. 1 (rather poor); *ibid*, op. cit., 1906, vol. xviii., p. 50, "Western Port."

To the author's definition I may add that the protoconch is conical, of three whorls, subconvex, suture shallow, whorls minutely granulated in spiral rows, fifteen in the third whorl. The length is 4·1 mm.; of the body-whorl, 2·8 mm.; and breadth, 1·6 mm.

Dredged in Gulf St. Vincent and Backstairs Passage, depth not noted, 17 fresh and dead; in 15 to 20 fathoms off St. Francis Island, 2 very poor; in 35 fathoms, 2 poor; in 62 fathoms north-west of Cape Borda, 1 good and 3 poor; in 90 fathoms off Cape Jaffa, 1 poor; in 104 fathoms off Neptune Islands, 1 poor.

I have called it a *Mitromorpha* rather than a *Mangilia*, although it has no visible labial nodules or plaits, because it seems very closely allied to *M. alba*, var. *axiscalpta*, above described.

*Mitromorpha axicostata*, n. sp. Pl. xxviii., fig. 4. 763

Shell solid, elongate-oval, of 6 whorls, including the pointed protoconch of 2½ smooth convex whorls. Spire-whorls slightly convex. Suture simple, marginated by a flat, narrow band. Base moderately contracted. Aperture elongate-oval, slightly constricted into a short, open canal. Outer lip thin, simple, convex in profile, with a shallow, wide depression just below the ascending suture. Inner lip complete, an applied thin glaze, callous at the suture. Columella long, nearly straight, slightly prominent at junction with concave base of body-whorl. No definite plait. Oblique rounded axial costæ, as wide as the interspaces, absent from the base, and vanishing towards the aperture. Spiral liræ flatly convex, wider than their spaces, cross the ribs, nine in the penultimate, twenty-five in the body-whorl.

*Dim*.—Length, 4·9 mm.; of the body-whorl, 2·4 mm.; breadth, 2·1 mm.

*Locality*.—Type from 104 fathoms 35 miles south-west

of Neptune Islands, with 9 good and 24 poor; also in 40 fathoms off Beachport, 3 fresh; in 90 fathoms off Cape Jaffa, 1 good, 3 poor; in 110 fathoms off Beachport, 1 good, 1 poor; in 130 fathoms off Cape Jaffa, 3 moderate.

When fresh there is a walnut-coloured band over the middle third of the body-whorl, less extensive in the intercostal spaces. This appears above the suture in the spire-whorls; the costæ are dotted above, and there are curved axial lines of dots on the liræ at the base. The size may reach to—Length, 73 mm.; of the body-whorl, 3·6 mm.; breadth, 3 mm. The ribs in the longer form may be much narrower, and may be obsolete before reaching the body-whorl.

This species approaches very close to *Mangilia*, and may belong to that genus.

*Mitriphora* **Mitromorpha paula**, n. sp. Pl. xxviii., fig. 5. 759

Shell, minute, solid, of  $4\frac{1}{2}$  whorls, including a blunt protoconch of 2 whorls, which are convex and apparently smooth, but microscopically granular, separated by a linear suture; it ends abruptly, and from within it issue the spirals of the first spire-whorls. Perfect specimens show the granules in very close-set spiral rows. Spire-whorls slightly convex, with eight spiral liræ. Sutures simple. Body-whorl large, tapering anteriorly. Aperture elongate-oval, rather widely open in front; outer lip simple, crenulated outside by the sculpture, slightly convex in profile, with a minute round, shallow sinus close to the suture; inner lip is a complete narrow glaze; there are twenty-three spiral liræ, flat-topped, half as wide as the interspaces, axially faintly incised. Colour is cinnamon-brown, lighter in a band on the prominence of the whorls.

*Dim.*—Length, 3 mm.; of the body-whorl, 2·1 mm.; breadth, 1·35 mm. A second example is 3·8 mm. by 1·5 mm.

*Locality*.—Type from Gulf St. Vincent, depth unrecorded, with 70 others in good and moderate condition; in 22 fathoms Backstairs Passage, 4 alive, 5 dead.

It is not unlike *Pleurotoma (Theshia) eritima*, Watson, Chall. Reps. Zool., 1886, vol. xv., p. 329, pl. xxiii., fig. 2, but is larger and has spirals half, instead of twice, as wide as the grooves.

*Mitriphora* **Var. leuca**, n. var. 760

This is quite white, and is generally rather narrower than the type of *paula*.

Dredged in 20 fathoms Investigator Strait, 1 good; in 45 fathoms north of Neptune Islands, 1 good; in 49 fathoms

off Cape Jaffa, 1 good and 1 very good, with a spiral row of distant brown spots in the spire-whorl, extending round the body-whorl; in 62 fathoms north-west of Cape Borda, 3 very good, 9 good; in 90 fathoms off Cape Jaffa, 2 good; in 104 fathoms 35 miles south-west of Neptune Islands, 3 good; in 110 fathoms off Beachport, 1 quite fresh, with some brown staining in the middle third of the outer lip; in 130 fathoms off Cape Jaffa, 1 poor.

These seem to affect deeper water than the type.

*Mitrichardia* *Mitromorpha-paucilirata*, n. sp. Pl. xxvii, figs. 8 and 9. <sup>954</sup>

Shell elongate-oval, of 5 whorls, including a blunt protoconch of 2 convex whorls, apparently smooth, but microscopically minutely punctate from crowded spiral and axial liræ: the latter become more conspicuous just before the abrupt termination of the protoconch; suture simple, impressed. Spire-whorls convex, suture distinct, bounded below by a round spiral. Body-whorl oval, tapering anteriorly; base very faintly excavate. Aperture oblique, narrowly oval; outer lip thin, simple, corrugated by the spirals, convex in profile, with a shallow, round sinus near the suture; inner lip a glaze, thicker on the columella, which is straight and forms a round, open angle with the slightly concave base of the whorl. There are four spirals in the first whorl, five in the second, and seventeen in the body-whorl, becoming crowded towards the snout, about one-third the width of the concave interspaces, which are well roughened (and the spirals slightly so) by crowded fine distinct oblique axial liræ. The spirals are opaque-white in colour, and are faintly articulated with tiny brown subdistant spots; the labrum is brown-stained outside. In some examples there is a row of brown blotches in each whorl, running round the body-whorl to a little above the middle of the labrum.

*Dim.*—Length, 4 mm.: of the body-whorl, 2·3 mm.; breadth, 1·7 mm.

*Locality*.—Type dredged in 90 fathoms off Cape Jaffa, with 17 good ones and 28 moderate; in 62 fathoms off Cape Borda, 2 good; in 104 fathoms off Neptune Islands, 7 good and 8 moderate; in 110 fathoms off Beachport, 1 good.

It resembles *M. angusta*; but this is longer and has eight spirals in the penultimate and twenty-eight in the body-whorl. It differs from *M. paula*, var. *leuca*, in having fewer spirals, more convex whorls, in an excavate depression below the spiral which bounds the suture, and in the more convex whorls and deeper suture of the protoconch.

~~Mitrikhana~~ *Kur. crassilirata*, n. var.

758

This is slightly larger, 4·5 mm. long and 1·7 mm. broad, and more solid, with the same number of spirals, but these are much stouter, the infrasutural cord being specially round and conspicuous.

Dredged in 55 fathoms off Cape Borda, 1 very good.

*Mitromorpha pallidula*, Hedley.

*Mitromorpha pallidula*, Hedley, Proc. Linn. Soc., New South Wales, 1905, vol. xxx., part 4, p. 534, pl. xxxii., fig. 26, "Manly Beach, near Sydney," also "24 fathoms off Derwent River, Tasmania"; Gatliff, Proc. Roy. Soc., Victoria, 1907, vol. xx. (N.S.), part 1., p. 32, "Port Albert."

Dredged in 35 fathoms off St. Francis Island, 1 alive; in 62 fathoms off Cape Borda, 1 moderate; in 90 fathoms off Cape Jaffa, 2 poor; in 130 fathoms off Cape Jaffa, 8 good; in 110 fathoms off Beachport, 6 good.

*Noto-coelialis*

*Natica sticta*, n. sp. Pl. xxix., figs. 4, 5, and 6. 493

Shell solid, ovately-globose, of  $3\frac{1}{2}$  whorls. Spire scarcely raised, whorls flatly convex. Suture distinct, linear. Aperture semi-circular; outer lip thin, simple. Inner lip distinct, raised into a callous pad, which, with that of the straight columella, almost completely fills the large umbilicus. In young shells the umbilicus is wide, open to the apex, and with a spiral funicle winding up to the middle of the columella. Surface shining and smooth, but for sublenticular accremental scratch-lines, most marked at the border of the umbilicus. There are three spiral rows of brown marks, axially elongate, and somewhat zigzag.

Dim.—Length, 8·5 mm.; breadth, 7 mm.; height, 5·25 mm.

*Locality*.—Type from 130 fathoms Cape Jaffa, with many others quite fresh. Dredged also in 16 fathoms outside Backstairs Passage, 3 good; in 17 fathoms Gulf St. Vincent, 5; in 40 fathoms off Beachport, 26 good; in 45 fathoms east of North Neptunes, 4; in 55 fathoms off Cape Borda, 15 dead, also in 62 fathoms, 29 minute; in 110 fathoms off Beachport, 60; and in 150 fathoms, 1 fresh.

As no individual was taken alive to provide an operculum, the genus is not certain; but I think it will prove to be a *Natica* with a shelly operculum. Some shells have an additional ornament in a dull-brown infrasutural continuous band.

*Eunaticina albosutura*, n. sp. Pl. xx., figs. 10 and 11.

Shell flatly globosely oval, of 4 whorls, including a protoconch of 2 smooth, flat whorls, ending abruptly. Spire-whorls rapidly increasing; spire flatly round, apex scarcely exsert. Suture linear, slightly descending at the aperture. Aperture obliquely semi-circular. Outer lip curved, less behind than in front, thin, simple, scarcely retiring at the suture. Inner lip distinct, short, opaque-white, thick, with a marked triangular callus joining it to the outer lip, just within the margin of which is a shallow gutter running to the suture. Columella long, straight, slightly reflected over the umbilicus behind, narrower in front, curving into the basal lip at rather more than a right angle. Umbilicus very open to the apex, with a central broad, low spiral funicle running into the middle of the columella. Sublenticular, minutely wavy, axial and spiral scratch-lines. Colour light-yellowish-brown, with a central white spiral, and a gradually widening infrasutural white band, corresponding with the labial callus. Operculum horny, paucispiral, nucleus towards the inner front part. In life there is a thin epidermis; the animal can completely retract within the shell.

Dim.—Length, 18 mm.; width, 12·5 mm.; height, 9 mm.

*Locality*.—Type from 25 fathoms Thorny Passage; in 15 to 20 fathoms Investigator Strait, 2 recent; in Gulf St. Vincent, depth unrecorded, several alive and dead.

*Diagnosis*.—The species is closely allied to *Natica umbilicata*, Quoy and Gaimard, or *Naticina picta*, Reeve; but is somewhat heavier, with a rather less prominent spire, and with a much thicker callus in the back of the aperture. When lying on its base with the anterior part of the aperture towards the observer, the shell has a greater vertical slope towards the right, and does not look so round; and when the base is upwards and the apex away from the observer, the umbilicus is more largely visible.

*Vanikoro denselaminata*, n. sp. Pl. xxix., figs. 1, 2, and 3.

Shell small, delicate, dull-white, globosely oval of  $3\frac{1}{2}$  whorls. Protoconch one whorl and a half, apex exserted, with three bold spiral ribs, ending abruptly. Sutures deep. Spire-whorls convex, rapidly increasing; with erect axial lamellæ, close set and becoming progressively more crowded. No spirals. Umbilicus large, perspective, with crowded oblique axial striae, and a bold, twisted carina winding down its whorls, and outside this a furrow which gets wider and shallower on the base of the shell. Aperture oval, truncated

at the base. Inner lip a glaze on the body-whorl. Columella very long, straight. Basal lip straight, joining the columella at a right angle, and the uniformly-curved outer lip at a rounded obtuse angle.

*Dim.*—Length, 3·2 mm.; breadth, 2·1 mm.

*Locality.*—Type Gulf St. Vincent, depth unrecorded, with 2 others: Venus Bay beach, 1.

*Spixystus*

*Trophon segmentatus*, n. sp. Pl. xxiv., fig. 3. 575

Shell fusiform of 7 whorls, including a protoconch of 2 smooth convex whorls, with a deep suture. Spire-whorls boldly angled above the middle, and constricted towards the simple suture. Base gradually contracted to a moderately long snout. Aperture roundly oval, opening abruptly in front into a canal of equal length, slightly deviated to the left, and not recurved. Outer lip thin and corrugated; inner lip a complete, prominent, erect lamella. Sculpture elaborate: axial laminæ, twelve in the penultimate, rather solid, imbricating, coronating the angle with rather long, open tubiform scales, curving up and back, and frilled with recurved valid scales distributed in spiral rows as though along spiral liræ, two in each spire-whorl and ten in the body-whorl, extending over the base, and over the back of the canal. Colour white, with a narrow brown band immediately above the suture, and from behind the aperture round the base to the front part of the labrum.

*Dim.*—Length, 8·5 mm.; of the body-whorl, 4·6 mm.; width, 3·5 mm., excluding the long scales.

*Locality.*—Type in 90 fathoms off Cape Jaffa, with 27 others good; in 130 fathoms, 11 good; in 110 fathoms off Beachport, 11 good; in 150 fathoms, 4 good; in 200 fathoms, 4 good; in 104 fathoms off the Neptune Islands, 20 good, small.

*Spixystus*

*Trophon pliciflaminatus*, n. sp. Pl. xxiv., figs. 1 and 2. 576

Shell thin, long, narrow, fusiform, of 8 whorls, including a protoconch of 2 smooth, convex, prominent whorls. Spire-whorls convex, swollen, and angled above the middle, contracted towards the distinct simple suture. Body-whorl convexly contracted below the angle, then concavely produced into a long, narrow snout. Aperture oval, wider behind; canal long, narrow, slightly oblique to the left, not recurved, making a faint round angle with the base of the columella. Inner lip a thin applied glaze. Axial lamellæ, fifteen in the penultimate, from suture to suture, erect and imbricating, projecting at the angle in long, open tube-like upward-curv-

ing scales, and below this folded in two spiral lines. In the body-whorl are four of these spiral foldings, progressively decreasing in size towards the base of the shell, in front of which the lamellæ are crenulate as they run along the snout, which they cross to the right further and further forward as they approach the aperture.

*Dim.*—Length, 13·9 mm.; of body-whorl, 9·8 mm.; width, 5·3 mm.

*Locality.*—Type in 150 fathoms off Beachport; in 200 fathoms, 2 good.

*Benthocystes*

*Trophon recurvatus*, n. sp. Pl. xxiv., figs. 7 and 8. *sy3*

Shell fairly solid, elongate-conical, of 7 whorls, including a prominent conical protoconch of  $2\frac{1}{2}$  smooth, convex turns, separated by a deep suture, and with a curious acute exsert apex. Spire-whorls short, wide; with very oblique simple sutures; swollen, sharply angulate just above the middle, below which in the body-whorl the base is rapidly contracted. Aperture roundly oval; canal about as long as the aperture, slightly deviated to the left, forming an open angle with the columella, markedly recurved. Outer lip thickened, equidistantly biangulate; inner lip inconspicuous. The sculpture consists of axial lamellæ, thirteen in the penultimate, which are folded into prominent scales at the angle; and in the body-whorl, at a spiral cord (which starts at the suture from the back of the aperture, runs round the base, and angulates the outer lip); and then crenated run over three obsolete spirals winding round the base, and finally bend in turn to the right over the back of the canal. It is of a uniform light-horn colour.

*Dim.*—Length, 6·7 mm.; of the body-whorl, 3·6 mm.; width, 3 mm.

*Locality.*—Type in 200 fathoms off Beachport.

The recurved short canal distinguishes it from *T. plici-laminatus*.

*adusta* *Mitra arnoldi*, n. sp. Pl. xxiv., fig. 6. *6yy*

Shell solid, elongate-oval, of 7 whorls, including a blunt brown protoconch of 2 convex smooth whorls. Spire-whorls convex in the upper half, nearly straight in the lower. Suture distinct, very narrowly tabulate. Base moderately roundly contracted. Aperture elongate-oval. Outer lip simple, thin, profile slightly sinuous, with numerous spiral plies in the throat. Columella nearly straight, slightly cut away to the left in front, with four stout oblique plaits; notch with a narrow reflected edge. Wide, round, low axial ribs, much

wider than the interspaces, thirteen in the penultimate, undulating the suture, vanishing on the base of the body-whorl and towards the aperture. Articulated with infrasutural large irregular blackish-brown blotches, about nine in the body-whorl; and with two similar approximate spiral rows, the upper the larger, winding round the base from the back of the aperture, below which are dark maculations. A spiral of close-set axial, narrow, brown hair-lines covers the lower third of each spire-whorl, and runs between the two rows of larger articulations on the body-whorl.

*Dim.*—Length, 12 mm.; body-whorl, 6·25 mm.; width, 5 mm.

*Locality.*—Type, beach Petrel Bay, St. Francis Island, many; MacDonnell Day, rare.

It is named after Master Francis Arnold, of St. Francis Island, who was of great help to me when collecting on that island, made historic by the visits of Matthew Flinders and Mons. Baudin.

*obustro***Mitra bellapicta**, n. sp. Pl. xxv., fig. 1. 68.24

Shell elongate-oval, of 7 whorls, including a blunt protoconch of 2 smooth, convex whorls. Spire-whorls convex, fullest just below the middle. Sutures linear, impressed. Base roundly contracted. Aperture obliquely narrowly oval. Canal wide, very short, slightly recurved, scarcely notched. Columellar plaits four, strong, the lowest very small. Outer lip thin and simple. Axial costæ, twelve in the penultimate, six in the body-whorl, vanishing towards the base and towards the aperture; three spiral cords wind over the dorsum of the base, above, and smaller than the columellar plaits.

Colour pinkish-brown. The spire-whorls have a white band just below the middle, bounded above and below by a line of opaque-white spots, and outside this by a fine broken brown hair-line. There is a row of small brown spots below the suture. In the body-whorl is also an articulated spiral of closely-set, axially-curved white and brown spots, commencing just within the back of the aperture. Obscure white and brown maculations tint the front of the base.

*Dim.*—Length, 9·6 mm.; body-whorl, 5·5 mm.; width, 5·1 mm.

*Locality.*—Type from 40 fathoms off Beachport, with 12 others in moderate condition.

This may be a variety of *M. vineta*, A. Adams (*volutomitra*), close to *M. weldii*, Tenison-Woods.

*Astro-Mitra retrocurvata*, n. sp. Pl. xxiv., figs. 4 and 5.

678

Shell fusiform, of 8 whorls, including a prominent protoconch of 2 smooth, well-rounded whorls, with a blunt apex. Spire-whorls convex, with deeply-impressed sutures. Body-whorl large, roundly contracted at the base into a snout, well curved dorsally and to the left. Aperture oblong-elliptical, opening gradually into an open canal with a wide, shallow notch. Outer lip thin and simple. Inner lip a complete very thin applied glaze. Columella very long and convexly curved, with four oblique plaits, the highest rather distant. Valid axial ribs, from suture to suture, twenty-one in the body-whorl, concave forwards, trigonal, with widely-sloping sides, vanishing rapidly below the periphery of the body-whorl. Under the microscope a few obsolete narrow spirals are detectable. Over the base are sixteen oblique spirals, issuing from beneath the inner lip, most valid in front and gradually vanishing upwards; among them are the larger columella plaits. The incremental striae are fine, most marked on the back of the canal, where they validly cross the oblique spirals. Colour yellow-brown, with a white central broad band divided by a narrow colour band; the base is indistinctly axially flamed with white.

*Dim.*—Length, 16·5 mm.; body-whorl, 10·75 mm.; width, 6·25 mm.

*Locality*.—Type from 110 fathoms off Beachport, with 7 others; in 150 fathoms, 4 moderate.

The special character is the arched canal. In some of the cotypes the axial ribs fade out on the third whorl, and in others on the fourth.

*Ramolia* *Olivella* (?) *adiorygma*, n. sp. Pl. xxv., figs. 3 and 4.

662

Shell small, solid, obliquely elongate-oval, smooth and white; apex blunt; whorls four, sloping convex. Suture linear, not canaliculate. Aperture oval, narrowed behind, widely open in front, notched; outer lip ascending at the suture, simple, bevelled inside; inner lip a glaze over the columella, which has no plaits.

*Dim.*—Length, 5·2 mm.; of body-whorl, 3·35 mm.; width, 2·3 mm.

*Locality*.—Type from Backstairs Passage, 17 fathoms, with 1 other specimen; Gulf St. Vincent, depth unrecorded, 2, all dead.

*Diagnosis*.—It differs from *Olivella* in the absence of a canaliculate suture, and from the Volutidae in its smooth columella. Its generic location is not known to me.

*Olivella solidula*, n. sp. Pl. xxv., figs. 7 and 8. 661

Shell small, solid, shining-white, smooth, obliquely elongate-oval. Apex blunt, four whorls, sloping convex, suture well channelled. Aperture oval, contracting gradually to a linear gutter posteriorly, widely open in front, and notched; outer lip simple, smooth; inner lip is a narrow, thick glaze over the base to the suture, slightly spreading over the columella.

*Dim.*—Length, 6 mm.; of body-whorl, 4 mm.; width, 2·3 mm.

*Locality.*—Type from 55 fathoms off Cape Borda, with 1 other; Backstairs Passage, 22 fathoms, 3 specimens; Gulf St. Vincent, (?) depth, 3, none alive; Venus Bay beach, 1.

*Diagnosis.*—It differs from *O. triticea*, Duclos, in having fewer whorls, being more solid, not so contracted anteriorly, and in not having a wide callus winding from the inner lip over the front of the dorsum; from *O. exquisita*, Angas, which it closely resembles, in being smaller, narrower, and pure-white.

*Baraspira*

*Ancilla beachportensis*, n. sp. Pl. xxiv., fig. 9. 660

Shell solid, oval, of 4 whorls. Apex markedly papillate. Spire completely covered with callus, almost obliterating the sutures, which are indicated by shallow furrows, between which over each whorl are some three low, broad spiral ridges. Aperture triangularly-oval, narrow behind, widely open in front, truncated, and widely notched. Outer lip simple, thin, with a callous thickening in its upper sixth, and with a tooth near its anterior end. Inner lip a thick callus, extending beyond the aperture, and up over the spire, where it recedes in steps just above each sutural groove. Columella nearly straight, truncate, with six oblique curved plaits in front. The body-whorl has two approximate grooves, winding round its base from above the middle of the aperture, the upper one to the labral tooth, the lower to just above the notch; a third lies above a band of callus extending from just above the columellar plaits to the left pillar of the notch; another groove bounds, at its lower edge, the spiral callus which spreads down from the suture and thickens the back of the outer lip. The body-whorl between these grooves has sublenticular axial and spiral scratchings, and has a faint-bluish-grey tint, whereas the callus is milk-white.

*Dim.*—Length, 20·5 mm.; of the aperture, 12 mm.; width, 9·5 mm.

*Locality.*—Type from 110 fathoms off Beachport, with 9 others.

**Philippiella rubra**, Hedley.

*Philippiella rubra*, Hedley, Proc. Linn. Soc., New South Wales, 1904, part 1, p. 207, pl. x, figs. 44 to 47. *Type locality*—“Eagle Hawk Neck, Tasmania”; also “Long Bay, New South Wales”; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), part 2, p. 69, “7 fathoms, Western Port, etc., Victoria”; May, Proc. Roy. Soc., Tasmania, 1908, p. 55.

MacDonnell Bay, shell-sand (Dr. Torr).

— — —  
EXPLANATION OF PLATES.

## PLATE XX.

- Fig. 1. *Philine beachportensis*, Verco, dorsal view.  
 ” 2. ” ” ventral view.  
 ” 3. ” ” posterior end.  
 ” 4. *Aglaja troubridgensis*, Verco, interior.  
 ” 5. ” ” exterior.  
 ” 6. *Cyclostrema jaffaensis*, Verco.  
 ” 7. ” ”  
 ” 8. *Philine evoluta*, Verco, exterior.  
 ” 9. ” ” interior.  
 ” 10. *Eunaticina albosutura*, Verco.  
 ” 11. ” ” ”

## PLATE XXI.

- Fig. 1. *Typhis bivaricata*, Verco, protoconch.  
 ” 2. ” ” dorsum.  
 ” 3. *Trophon latior*, Verco.  
 ” 4. ” ” protoconch.  
 ” 5. ” ” *longior*, Verco, protoconch.  
 ” 6. ” ”  
 ” 7. *Voluta fulgetrum*, Sowerby, var. *dictua*, Verco.  
 ” 8. *Danorania fenestrata*, Tate and May. 32 γ  
 ” 9. ” ” ” ” protoconch.  
 ” 10. *Cominella torri*, Verco.  
 ” 11. ” ” ” ”

## PLATE XXII.

- Fig. 1. *Triphora epallaxa*, Verco.  
 ” 2. ” *spina*, Verco.  
 ” 3. ” ” ” mouth.  
 ” 4. ” ” protoconch.  
 ” 5. ” ” *armillata*, Verco.  
 ” 6. ” ” *dexia*, Verco.  
 ” 7. ” ” ” protoconch.  
 ” 8. ” ” ” mouth.  
 ” 9. ” ” ” mouth.  
 ” 10. ” ” ” mouth.

## PLATE XXIII.

- Fig. 1. *Triphora spica*, Verco.  
 .. 2. " *cana*, Verco.  
 .. 3. " " " protocouch.  
 .. 4. " " " mouth.  
 .. 5. " *subula*, Verco.  
 .. 6. " " " protoconch.  
 .. 7. " *gemmagens*, Verco.  
 .. 8. " " " protoconch.

## PLATE XXIV.

- Fig. 1. *Trophon plicilaminatus*, Verco.  
 .. 2. " *segmentatus*, Verco.  
 .. 3. *Mitra retrocurvata*, Verco.  
 .. 4. " *arnoldi*, Verco. "  
 .. 5. *Trophon recurvatus*, Verco.  
 .. 6. " *Ancilla beachportensis*, Verco.

## PLATE XXV.

- Fig. 1. *Mitra bellapicta*, Verco.  
 .. 2. *Hemipleurotoma mayi*, Verco.  
 .. 3. *Olivella (?) adiorygma*, Verco.  
 .. 4. " "  
 .. 5. *Daphnella stiphra*, Verco. "  
 .. 6. " " protoconch.  
 .. 7. *Olivella solidula*, Verco. "  
 .. 8. " " "

## PLATE XXVI.

- Fig. 1. *Triphora latilirata*, Verco.  
 .. 2. *Drillia achatina*, Verco.  
 .. 3. " *trophonoides*, Verco.  
 .. 4. " " " protoconch.  
 .. 5. " *lacteola*, Verco. "  
 .. 6. " *hedleyi*, Verco.  
 .. 7. " *jaffaeensis*, Verco.  
 .. 8. " " " protoconch.  
 .. 9. " " " aperture.

## PLATE XXVII.

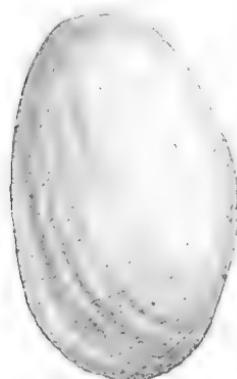
- Fig. 1. *Drillia costicapitata*, Verco.  
 .. 2. " " " protoconch.  
 .. 3. *Mangilia impendens*, Verco.  
 .. 4. *Mitromorpha angusta*, Verco.  
 .. 5. " " " protoconch.  
 .. 6. *Drillia subplicata*, Verco. "  
 .. 7. " *agrestis*, Verco.  
 .. 8. *Mitromorpha paucilirata*, Verco.  
 .. 9. " " " protoconch.

## PLATE XXVIII.

- Fig. 1. *Daphnella perplexa*, Verco.  
 " 2. " *bathentoma*, Verco. protoconch.  
 " 3. " *Mitromorpha axicostata*, Verco.  
 " 4. " *paula*, Verco.  
 " 5. *Daphnella fenestrata*, Verco.  
 " 6. " *triseriata*, Verco. protoconch.  
 " 7. " " "  
 " 8. " " "  
 " 9. *Mangilia gatliffi*, Verco.

## PLATE XXIX.

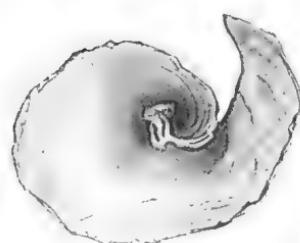
- Fig. 1. *Vanikoro denselaminata*, Verco.  
 " 2. " " " "  
 " 3. " " " "  
 " 4. *Natica sticta*, Verco, young. "  
 " 5. " " " "  
 " 6. " " " "  
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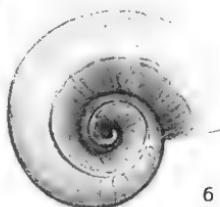
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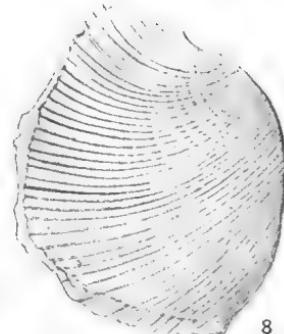
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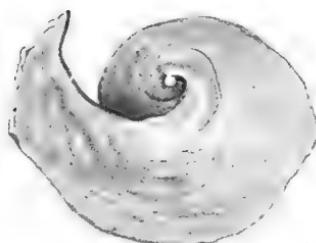
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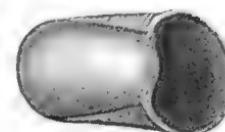
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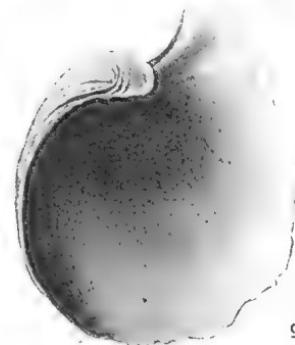
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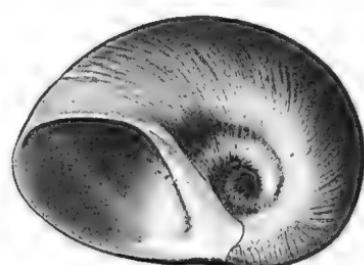
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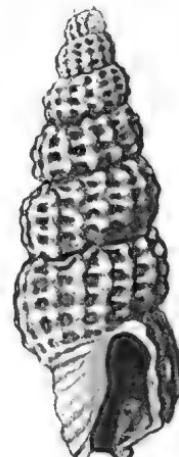
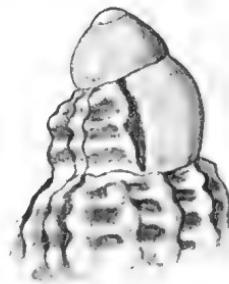


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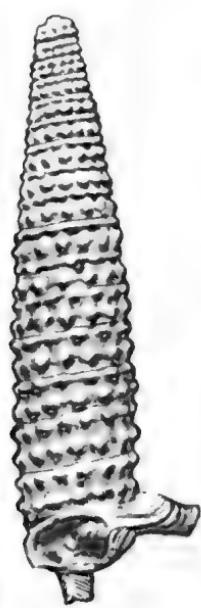


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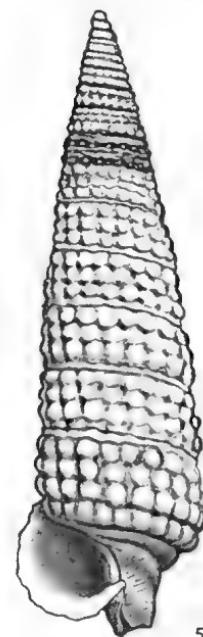
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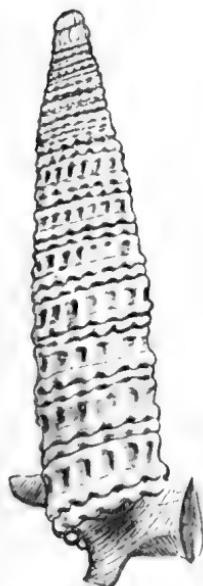
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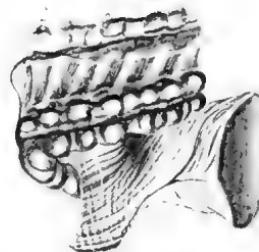
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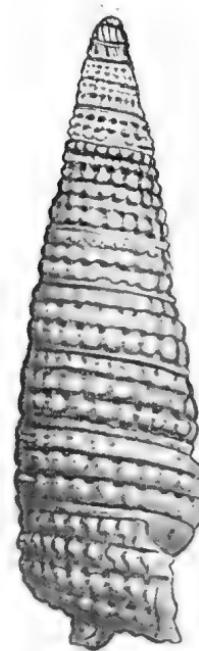
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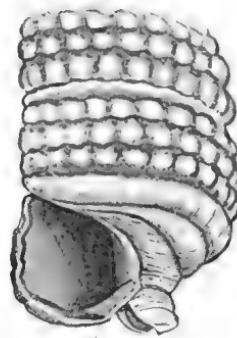
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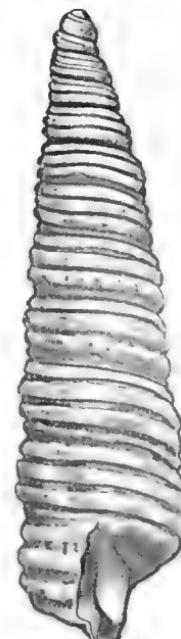
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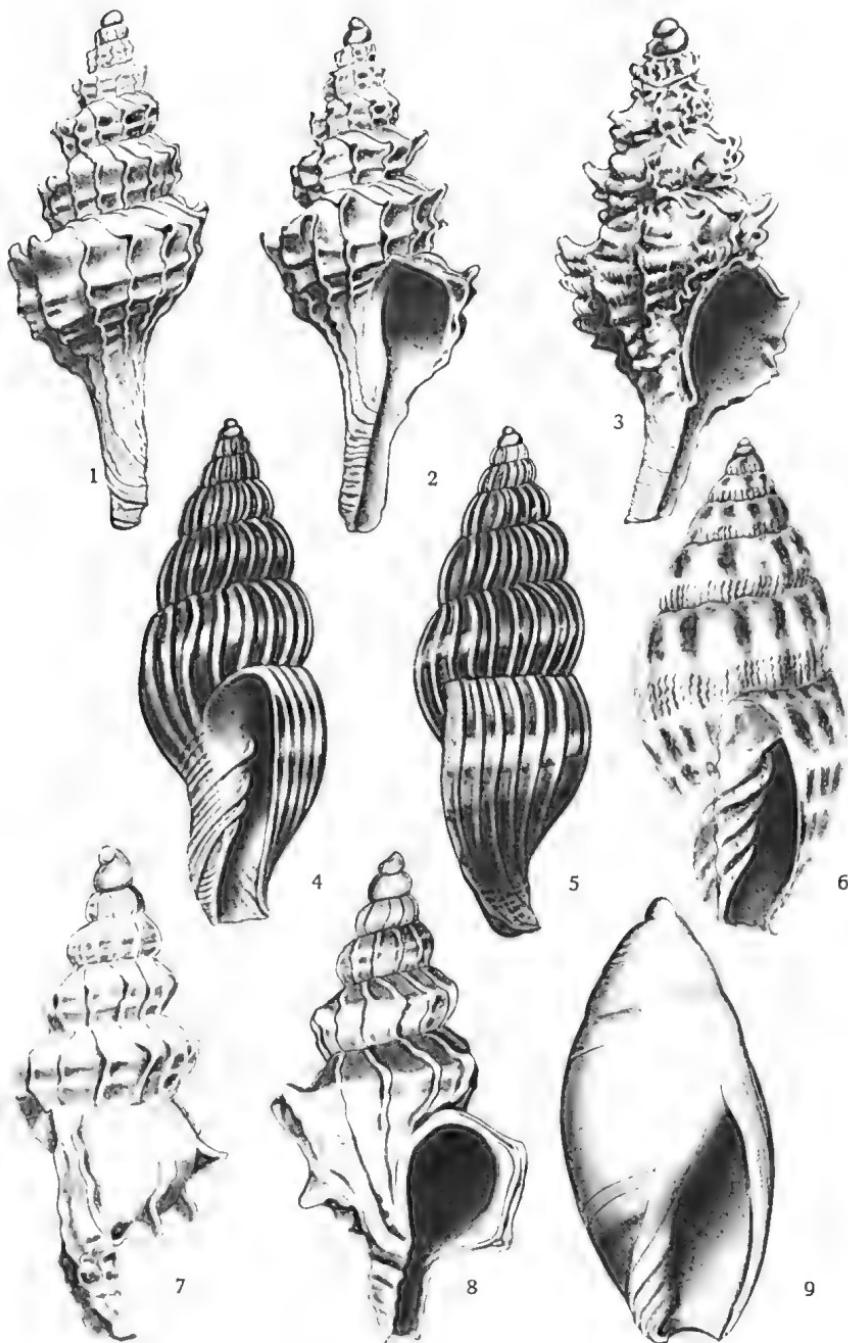


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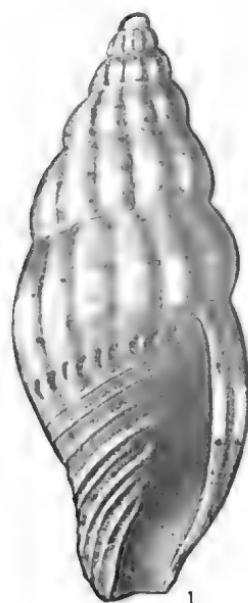


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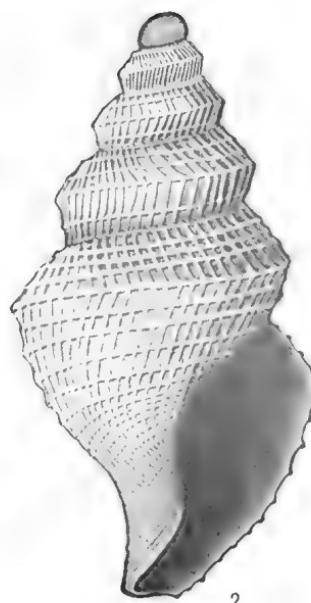
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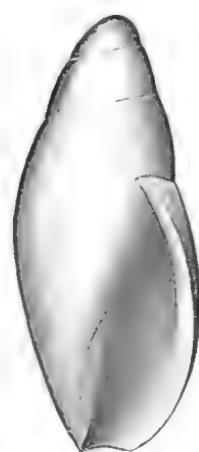
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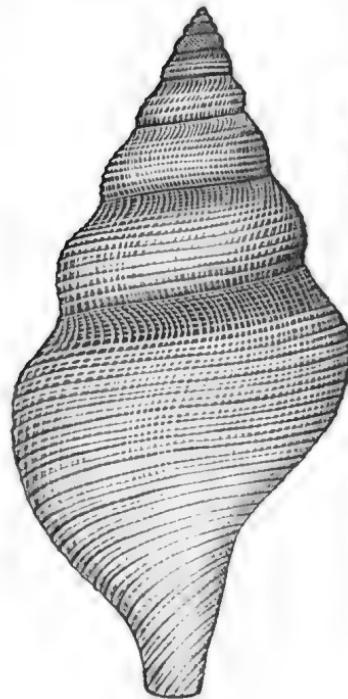
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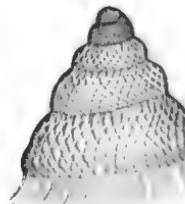
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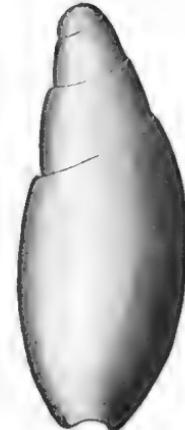
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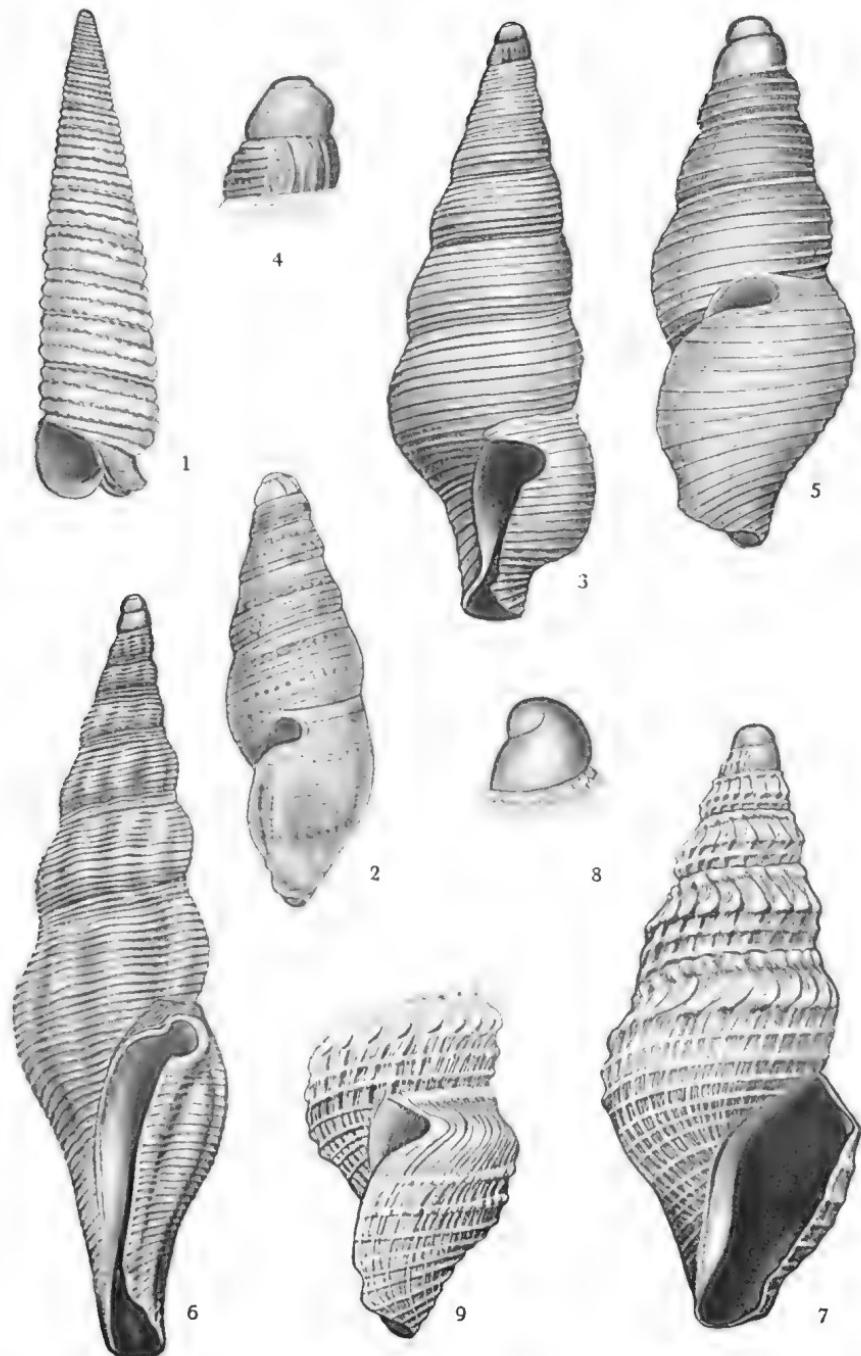


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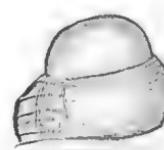
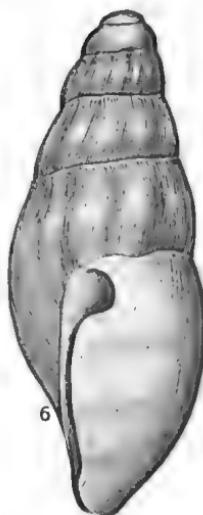
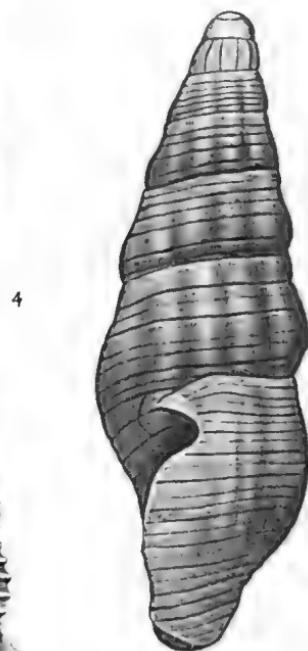
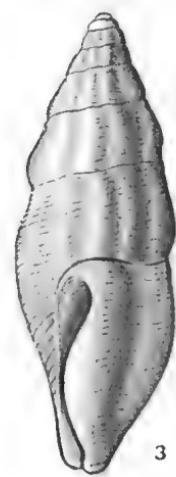
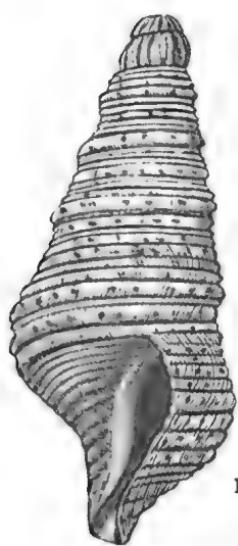


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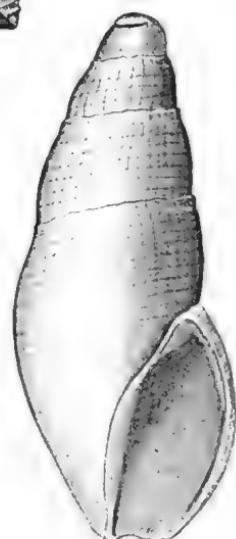
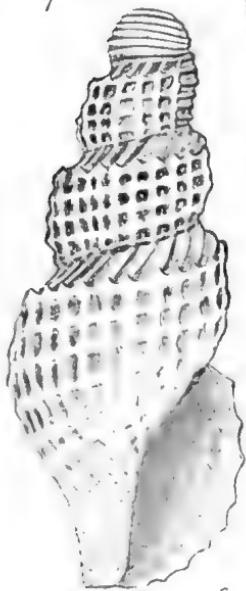
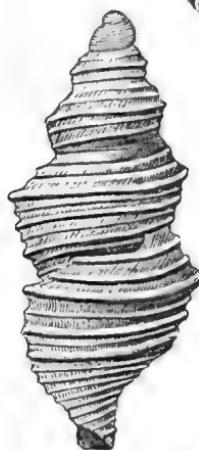
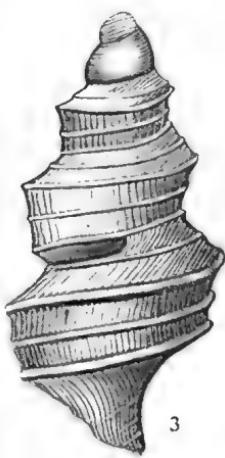
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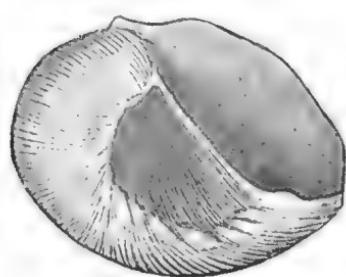
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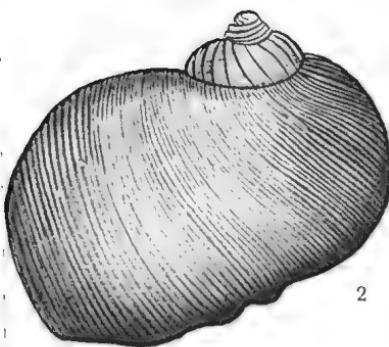
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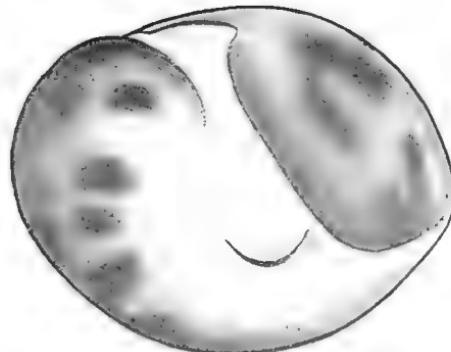
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see Publication No. 3

89

April 1910

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxiv., 1910.]

#### THE BRACHIOPODS OF SOUTH AUSTRALIA.

By JOS. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.), etc.

[Read April 5, 1910.]

#### PLATES XXVII. AND XXVIII.

In November, 1906, Professor F. Blochmann, of the Zoological Institute of the University of Tubingen, wrote to Professor Stirling, Director of the Adelaide Museum, requesting the loan of its Brachiopod material, so as to permit of his investigating the South Australian forms. He was working up the Brachiopods of the Valdivia and Gauss Expedition, and had been led into some important questions concerning the geographical distribution of the members of this group. As the Museum material was meagre, Professor Stirling passed the letter on to me, and I sent Professor Blochmann all our well-known forms, and as many other species as I had then separated, from the shells dredged during several years.

In the early part of this year he forwarded a communication to be used at my discretion, either as a paper by Professor Blochmann, presented by me, to be published in the Transactions of the Royal Society of South Australia, or as material for me to use in compiling a paper of my own. To combine the two ideas seemed the proper course, and with the acquiescence of the Council I present a paper on the Brachiopods of South Australia, which will deal with all the species hitherto found in our waters, and will incorporate Professor Blochmann's descriptions of his three new species, translated from his manuscript, and attributed, as they should be, to him as their author. We are indebted to him for the photographs of his three species. My remaining material has supplied two other new species, which I have described and figured.

The late Professor Tate, in a Revision of the Recent Lamellibranch and Palliobranch Mollusca of South Australia, Trans. Roy. Soc. of S. Austr., vol. ix., 1886, p. 76 to p. 111, enumerated five Brachiopods, namely, *Waldheimia flavescens*, Lamarck, now called *Magellania flavescens*; *Terebratella cancellata*, Koch, now *Terebratulina cancellata*; *Megerlia willemensis*, Davidson, which was a misidentification, and is the *Magasella vercoi*, Blochmann, n. sp.; *Kraussina lamarekiana*, Davidson, which remains unaltered: and

*Orbicula tenuis*, Sowerby, reported from Chili and Port Lincoln: this latter locality is certainly erroneous, no collector having taken it, so it is erased from our list.

In vol. xi., *op. cit.*, 1888, p. 69, Professor Tate added *Magasella cumingi*, Davidson; and in vol. xiv., 1891, p. 269, *Terebratula wyvillei*, Davidson, dredged by the "Challenger" in lat.  $42^{\circ} 22'$ , which is a considerable distance off our shores. This is now named *Liothyrida wyvillei*.

To the five species, belonging to five different genera above recorded by Professor Tate, we are able to add in this paper two previously-described species, *viz.*, *Kraussina atkinsoni*, Tenison-Woods, and *Cryptopora brazieri*, Crane; and five species hitherto undescribed, *viz.*, *Magasella vercoi* and *M. jaffaeensis* and *Cistella australis*, all of Blochmann; and *Magasella radiata* and *Terebratulina cavata*, both of Verco, bringing our number up to twelve species belonging to seven genera.

#### NEW BRACHIOPODS FROM SOUTH AUSTRALIA.

By F. BLOCHMANN, Tübingen.

Dr. Verco, of Adelaide, had the kindness to place in my hands a large number of Brachiopods for classification which he had collected off the coast of South Australia. For this I tender him my best thanks. The material embraced, besides well-known species from these waters, such as *Magellania flarescens*, *Magasella cumingi* and *Kraussina lamarekiana*, two *Magasellas* and one *Cistella*. About the first two, Dr. Verco properly presumed that they were forms hitherto unknown; the last he believed was *Cistella cuneata*, which from want of material for comparison is easily explicable. This species is also new. I give below an accurate description of the three species, and remark as follows:—Some authors question whether Brachiopods of the type of *Magasella* are independent forms, and are only immature stages of *Terebratella*—even though becoming sexually mature—but I hold this view is not correct in all cases. Among the examples of *Magasella vercoi* described hereafter, and also among the examples of *M. cumingi* sent to me by Dr. Verco are found, in considerable number, those which present all the marks of quite full-grown animals, especially a striking thickening of the shells in part, with loss of much of the more delicate sculpture; so that any further development of these forms is with certainty excluded. The genus *Magasella* is to be retained. I will return to this in fuller detail in another place.

*Pleothyris**Magasella vercoi*, n. sp., Blochmann. Pl. xxvii., figs. 1 to 5. / 15

Shell small, in outline of a slender pear shape, higher than wide, remarkably thickwalled, light to dark dull coral-red, with a conspicuous finger-shaped hinge process. The greatest width is somewhat in front of the centre. Beak stout, rather strongly bent dorsalwards, and then obliquely truncate, with a moderately large hole. Its sides are rounded, and towards the deltidial plate are finished off in a sharp edge. Deltidial plates large, joining together widely. Lateral edge of the ventral valve in the neighbourhood of the teeth raised dorsally in a low point, further forwards curving ventrally. Front edge distinctly convex dorsally.

Both valves are nearly equally deep. The incremental striae are in both quite distinct. To the square millimetre there are about 216 pores, the inner diameter of which amounts to  $20\ \mu$ . Their outer opening is oval, and measures  $25\text{--}30\ \mu$  by  $35\text{--}40\ \mu$ . Both valves are in their hinder part very massive. The thickness of the ventral valve at the beak amounts to about 0.6 mm. This circumstance, together with the somewhat thickened and in many examples distinctly contracted edge, shows with certainty that it has reached a full-grown stage. The colour is a dull lighter or darker coral-red.

The dorsal valve bears conspicuous tooth sockets, the free wall of which posteriorly projects over the hinge in a triangle. In front of the hinge lies a blunt finger-like hinge process. Under this, looking from the inner side, i.e., also dorsal, appears a hinge-plate, depressed in a furrow-like manner in the middle. The hollow space generally existing between the hinge-plate and the wall of the valve is filled up. To the hinge-plate is joined on a stout median septum, reaching as far as the middle or even somewhat further forwards. Its free edge is strongly curved from before backwards, corresponding to the curve of the valve. The brachial apparatus begins with short erura, which bear wide triangular inconspicuous crural processes. The descending limbs reach the median septum widening towards the front, and descending ventrally unite widely with this, run a short distance backwards towards the hinge, and are then united by a bridge somewhat variable in width and position. The brachial apparatus is colourless, or very pale-red. The anterior portion of this is in its general form somewhat variable.

*Dim.*—The size of the largest example before me and of another is:—

Length, 7.5 mm. and 6.5 mm.

Breadth, 4.0 mm. and 3.7 mm.

Thickness, 4.8 mm. and 4.4 mm.

*Locality.*—Backstairs Passage, near Adelaide, South Australia (Dr. Verco's Coll.).

*Gaffaria* *Magasella jaffaensis*, n. sp., Blochmann. Pl. xxvii, figs. 6 to 9.

Shell in outline almost circular (fig. 6), or from the middle forwards somewhat narrowed (fig. 8), both valves approximately equally deep and equally curved. Commisures in one plane. Growth striæ, in places distinct or obsolete. Beak short, wide, with moderately sharply-defined edges. Deltidial plates large, joined together. Hole small.

Number of pores, 170-230. Of three examples, one (fig. 8) has the higher number, 212-228; both the others, 170-212. Diameter of the round inner opening of the pores, 20-23  $\mu$ ; of the outer oval opening, 50 by 30  $\mu$ . Colour of the shells found dead, but well preserved, a dirty white.

The dorsal valve has a moderately-developed hinge process, and large tooth sockets with comparatively feeble walls. Between these lies a slightly undermined hinge-plate, sunken towards the middle, which extending as a narrow triangle passes over into the strong median septum. This ends abruptly behind the middle with a slightly curved edge. In the posterior half of its course it remains low, in the anterior it rises to a flat surface twice as high as the hinder portion, which on its ventrally-directed border is split in a furrow-like manner. From the wall of the tooth sockets spring short strong crura, with large slender pointed crural processes. The descending limbs widen rapidly towards the front, and are applied to the anterior elevated part of the septum, so that the edge of the limb, at first dorsal, then directed centrally, approximately strikes upon the middle of this elevated part of the septum. Towards the front they reach far over beyond the front edge of the septum. This strong widened part of the limb coalesces with the septum, so that it does not project forwards over it, then runs narrowing towards the border of the hinge and laterally, bends, still further narrowing, medially again, whereby the two limbs are united by means of a moderately wide bridge. A few small prickles occur at the free anterior border of the part uniting the ascending and descending branch of the limbs. The dorsal and ventral valves are in the posterior part moderately thick; this indicates that the examples are almost or quite mature.

*Dim.*—Size of the largest example: Length, 14·6 mm.; width, 13·5 mm.; thickness, 8 mm.

*Locality.*—Cape Jaffa, South Australia, 90 fathoms.

The form has been closely compared with examples of *Magellania flavescens* of the same size, and is immediately distinguished from them by its general shape, and especially by the very differently-shaped beak, and by the complete absence of ribs, which are already quite plain in really small examples of *M. flavescens*. Again, in the formation of the brachial apparatus distinct differences present themselves. By the general form, one might be reminded of young examples of *M. lenticularis* (the illustration of Davidson, Recent Brachiopoda, pl. ix., figs. 2 to 13), although this is not yet known from the Australian coast. But against this likeness are the much more strongly hook-shaped curved beak in the last-named form, the very small diameter of the inner orifices of the pores (scarcely  $10 \mu$ ), and the quite distinct pattern on the valves. Also, the brachial apparatus of the young figured example of Davidson is quite different. So it remains only to regard the examples before us as representatives of an independent new species.

*Cancellothoris*  
*Cistella australis*, n. sp., Blochmann. Pl. xxvii., 3  
 figs 10 to 12.

Shell as long as broad. Colour dirty-yellow.

Length and breadth are equal, thickness amounts to about one-half of this. Because the dorsal valve is bounded behind by a straight hinge-line, it approaches a semicircle in outline. The complete outline is altered by the triangular beak. The end of the beak is flatly rounded. Its edges are sharp. Between them and the hinge-line is a flat area. Deltidial plates seem wanting. The hole of the beak is large, bounded towards the front to a considerable extent by the hinge-margin of the dorsal valve.

Each valve bears a moderately conspicuous median sinus, and on each side of this three ribs, increasing rapidly in width towards the periphery. These project at the edge as rounded teeth, so that if the posterior corner is included, four rounded teeth are found at the edge, on each side of the notch corresponding to the median sinus. These are not always quite distinct, so that the edge often appears only flatly undulating. Also, variations occur between the right and the left. The growth striae in both valves are quite distinct. Both valves are about equally deep. There are about 320 pores to the square millimetre; inner diameter of these, about  $10 \mu$ ; outer diameter, about  $15-20 \mu$ ; frequently oval,  $20 \mu$  by  $10 \mu$ .

The edge of the pedicle hole forms a conspicuous collar. In the ventral valve is found an indistinct median septum

extending to the anterior border. On the right and left of this septum lie deep and extensive muscular impressions. Teeth moderately developed. In the dorsal valve is also found a median septum, which in the posterior half is scarcely distinguishable, but in the anterior half rises as an obtuse triangular process, reaching almost to the ventral valve. The tooth sockets are well developed. At their wall begins the brachial apparatus, the crural processes of which are moderately long and slightly pointed. After a short free course, nearly parallel with the inner surface of the valve, the limbs are applied to the inner surface of the valve, and then cease. Also from the median septum there stretches on either side to the inner surface of the valve a short little band, the ideal continuation of the hinder part of the limb.

*Dim.*—Size of the largest example: Length, 3 mm.; width, 3 mm.; thickness, 1.3 mm.

*Locality.*—Cape Willoughby, eastern end of Kangaroo Island (Dr. Verco's Coll.).

### *Cryptopora brazieri*, Crane. *T. R. B. No 3*

*Atretia brazieri*, Davidson, MS., Crane, Proc. Zool. Soc., Lond., 1886, p. 183; also, *op. cit.*, Dr. T. Davidson on Recent Brachiopoda, Appendix, p. 175, pl. xxv., figs. 16-17a. *Type locality*—Port Stephens, New South Wales, at 25 fathoms (J. Brazier).

*Cryptopora brazieri*, Crane; Hedley, Proc. Linn. Soc., New South Wales, 1906, vol. xxxi., part 3, p. 467, pl. xxxvi., figs. 1 and 2. Common at 17-20 fathoms around Masthead Island, Queensland.

Dredged at 6 fathoms, off St. Francis Island, 2 alive; at 40 fathoms, off Beachport, 2 good; at 49 fathoms, off Cape Jaffa, 1 perfect; at 62 fathoms, off Cape Borda, 27 perfect; at 90 fathoms, off Cape Jaffa, large numbers; at 104 fathoms, 35 miles south-west of Neptune Islands, 20 perfect; at 110 fathoms, off Beachport, 10 perfect; at 130 fathoms, off Cape Jaffa, 5 moderate; at 150 fathoms, off Beachport, 2 dead; at 300 fathoms, off Cape Jaffa, 4 dead. Its habitat in our waters seems to be at a depth of 60 to 110 fathoms. I have never taken it at so low a depth as 20 fathoms, that at which Mr. Hedley secured it in Queensland.

### *Aleystosothrysis-Liothyris-wyvillei*, Davidson. *6 in No 3*

*Terebratula wyvillei*, Davidson, Proc. Roy. Soc., Lond., vol. xxviii., p. 436, 1878; also "Challenger" Rep. Zool., vol. I., 1880, p. 27, pl. ii., figs. 7 and 8.

*Liothyris wyvillii*, Davidson, Proc. Linn. Soc., Lond., 1886, p. 15, pl. ii., figs. 8-14. *Type locality*—Off South Australia, in lat. 42° 42' S., long. 134° 10' E.; depth, 2,600 fathoms. Also off the coasts of Chili, Patagonia, and the Falkland Islands.

—*Terebratulina cancellata*, Koch. — *E. n. sp. 93*

*Terebratula cancellata*, Koch, in Küster, Conch.-Cah., 1843, Band vii., Abt. i., p. 35, pl. 2b, figs. 11-13. *Type locality*—Western Australia; Sowerby, Thes. Conch., 1846, p. 358, pl. lxxi., figs. 93-95, no locality cited.

*Terebratula (Terebratulina) cancellata*, Reeve, Conch. Icon., 1860, pl. iv., fig. 13.

*Terebratulina cancellata*, Dall., Proc. Acad. Nat. Sci., Philadelphia, 1873, p. 179. Davidson, "Challenger" Rep. Zool., 1880, vol. i., p. 37, pl. i., figs. 11-16, 35 to 40 fathoms, Bass Strait; also, Trans. Linn. Soc., Lond., 1886, Recent Brachiopoda, p. 35, pl. vi., figs. 1-8; Hedley, Memoirs Austr. Mus., 1902, vol. iv., p. 288, 50 to 60 fathoms, off Jibbon; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 114, 100 fathoms, off Cape Pillar, Tasmania.

Dredged alive at 15 fathoms in Backstairs Passage, 4; at 16, 17, 18, 20, and 22 fathoms, very many; at 30 fathoms, off Corney Point, Spencer Gulf, 17; at 40 fathoms, off Beachport, 3 alive and 11 dead, all small; at 55 fathoms, off Cape Borda, 1 alive 11 dead, all small, and at 60 fathoms, 10 dead, small; at 90 fathoms, off Cape Jaffa, 2 minute, dead; at 110 fathoms, off Beachport, 4 minute and 13 small, dead, and at 150 fathoms, 3 minute. It occurs in both our gulfs and both straits, and has its habitat from 15 to 30 fathoms. It may occur in shallower waters (in which I have dredged very seldom), as it has been taken in Port Jackson by Brazier in 3 and 7 fathoms. The "Challenger" took it abundantly in 35 to 40 fathoms. Beyond that depth only very immature specimens have been obtained by me.

*Cancellothyris*

*Terebratulina cavata*, n. sp., Verco. Pl. xxviii. 14  
figs. 1 to 5.

Shell thin-walled, translucent, oval, widest a little in front of the middle. Ventral valve very little deeper than the dorsal, convex longitudinally, especially towards the beak, transversely convex, slightly centrally flattened; lateral edges slightly concave, front slightly convex. Beak very short, obliquely truncated. Foramen of moderate size, incomplete, the anterior eighth formed by the back of the dorsal valve, bevelled from the outer to the inner edge. Deltidial plates narrow triangular, not meeting in the middle line. Teeth small, projecting inwards and backwards. Dorsal valve convex longitudinally and transversely, slightly prominent centrally, and sloping at the sides; lateral edges convex, anterior edge slightly concave. Hinge line narrow and straight. Tooth sockets well developed, excurved, and pointed ventrally. Crura rather short and stout. Loop annular, completed by a ventrally convex ventral crural

band: the side pieces are shallow and project obliquely forward: the dorsal band is longitudinally wide, concave dorsally, projecting well in advance of the ventral band, and with a deep, nearly square, sinus in its posterior edge (whence the specific name).

*Sculpture*.—Longitudinal ribs, about 12 at first, flatly triangular, crenulating the edge of the foramen, and increasing by trichotomous division. Growth lines scarcely visible; some irregularly-distant concentric shallow grooves.

*Dim.*.—Length, 16·25 mm.; width, 11·5 mm.; depth, 7 mm. The largest is 14 mm. wide. Another is 17·5 mm. by 12·25 mm.

*Locality*.—Type locality, at 130 fathoms, off Cape Jaffa, 37 examples, all dead (7 probably nearly or quite full grown, 5 small, and 25 very small); also, at 300 fathoms, 4 mature, 13 small, and 76 very small.

*Diagnosis*.—*T. cancellata*, Koch, is closely allied, but is flatter, has more numerous, rounder, rougher riblets arising by irregular intercalation; its loop is wider, and has narrower bands, and the dorsal bridge has posteriorly a blunt central projection instead of a sinus.

### *Magellania flavescens*, Lamarck.

*Terebratula flavescens*, Lamarck, Anim. S. Vert., vol. iv., 1819, p. 246, also vol. vii., 1836, p. 330. *Type locality*—The seas of India to Java. Conch.-Cab., Band vii., Abt. i., p. 45, sp. 27, pl. 2d, fig. 4.

*Terebratula australis*, Quoy and Gaimard, Voy. de l'Astr., 1834, Moll., vol. v., p. 551, pl. lxxxv., figs 1-5, Port Western, Vict.; Sowerby, Thes. Conch., 1847, p. 349, sp. 13, pl. lxix., figs. 25-33.

*Terebratula dentata*, Lamarck, Anim. S. Vert., 1836, vol. vii., p. 331. *Type locality*—The southern seas (?), Peron.

*Terebratula incurva*, Quoy and Gaimard, loc. cit., p. 554, pl. lxxxix., figs. 11 and 12.

*Waldheimia flavescens*, Lamarck, Reeve, Conch. Icon., 1860, pl. 1 and 2, figs. 1a, b; Tenison-Woods, Proc. Roy. Soc., Tasm., 1878 (1877), p. 57, north coast of Tasmania; Davidson, "Challenger" Rep. Zool., vol. i., 1880, p. 41, pl. iii., figs. 10-12; also, Proc. Linn. Soc., Lond., vol. iv., 1886, p. 41, pl. vii., figs. 6-19; Hedley, Memoirs Austr. Mus., vol. iv., 1902, p. 289, 11 to 15 fathoms, off the Crookhaven River.

*Magellania flavescens*, Lamarck, Tate and May, Proc. Linn. Soc., New South Wales, vol. xxvi., 1901, p. 441.

Found all along the South Australian coast, as far as Point Sinclair. Dredged alive at all depths from 6 to 30 fathoms in numbers; at 40 fathoms, off Beachport, 10, from very minute to 1 quarter-grown; and at 100 fathoms, 19 minute, alive.

*Magadina* **Magasella cumingi**, Davidson. 15

*Terebratella (?) cumingii*, Davidson, Ann. and Mag., Nat. Hist. 1852, 2nd ser., vol. ix., p. 368, and Proc. Zool. Soc., Lond., 1852, p. 78, pl. xiv., figs. 10-16.

*Terebratula (Bouchardia) cumingii*, Reeve, Conch. Icon., 1861, pl. viii., fig. 30.

*Magasella cumingii*, Davidson, "Challenger" Rep. Zool., vol. i., 1880, p. 48.

*M. cumingi*, Davidson, Proc. Zool. Soc., Lond., 1886, p. 97, sp. 54, pl. xvii., figs. 23-32.

*Magas cumingi*, Davidson, Augas, Proc. Zool. Soc., Lond., 1867, p. 935. "deep water outside Port Jackson Heads."

*Terebratula (Bouchardia) fibula*, Reeve, Conch. Icon., 1861, pl. viii., fig. 30.

Dredged in both gulfs and both straits at 12 fathoms, 75 alive; at 13 fathoms, 6 alive; at 15 fathoms, 51 alive; at 17 fathoms, 83 alive; at 20 fathoms, very many; at 22 fathoms, great numbers; at 27 fathoms, 2 alive; at 30 fathoms, several dead; at 35 fathoms, off St. Francis Island, 2 alive; at 40 fathoms, off Beachport, 15 small, dead; and at 49 fathoms, 24 small, dead; at 55 fathoms, off Cape Borda, 7 small, dead; and at 62 fathoms, 27 small, dead; at 90 fathoms, Cape Jaffa, 10 minute; at 110 fathoms, Beachport, 20 perfect (several alive up to full-grown); at 130 fathoms, Cape Jaffa, 26 minute and up to adult; at 150 fathoms, Beachport, 19 perfect, small, and 15 valves; and at 200 fathoms, 7 dead, very poor.

*Murrava* **Magasella exarata**, n. sp., Verco. Pl. xxviii., figs. 6 to 8. 2

Shell small, solid, oval, compressed dorso-ventrally, white. Dorsal valve nearly flat, with a shallow median furrow widening anteriorly; slightly convex longitudinally and transversely: lateral margin sinuous, convexo-concave from behind, and convex in front to correspond with the median sinus. Ventral valve twice as deep as the dorsal, uniformly convex longitudinally. Beak projecting considerably beyond the hinge line, solid, slightly curved dorsally. Foramen triangular, completed in front by the dorsal valve, rounded behind, and not extending to the end of the beak; bounded at the sides by a solid, stout, low lamina. Sculpture, numerous axial diverging riblets, increasing by intercalation, with concentric riblets, somewhat irregular in size and distance. Border internally plicately toothed. The hinge teeth in the ventral valve are very low and small and tubercle-like. In the dorsal valve the laminæ on the inside of the tooth sockets are prominent and solid. From the anterior end of their bases two short stout processes project forwards ventrally, and converge without uniting. Two

low ridges also extend forwards on the wall of the valve from the bases of the laminae, and unite just in front of its centre, and continue as an obsolete ridge to the front margin.

*Dim.*—Length, 7·75 mm.; width, 5·5 mm.; depth, 2 mm.

*Diagnosis.*—*M. cumingi*, Davidson, is smooth, without external sculpture, and has a fine foramen at the end of the beak.

*Locality.*—Type, at 150 fathoms, off Beachport, with 1 other good and 1 of a narrower form; also, at 40 fathoms, 2 good, and at 110 fathoms, 1 good and 1 valve; at 49 fathoms, off Cape Jaffa, 1 small.

### *Pinothyridia Magasella vercoi*, Blochmann, *unpub.* //

I may add to the locality given by the author.

Dredged in Backstairs Passage, at 16 to 18 fathoms, 15 alive, many dead; at 19 fathoms, a great many alive and dead, probably 200; at 20 fathoms and at 22 fathoms, very many; at 40 fathoms, off Beachport, 2 good and 3 moderate; at 62 fathoms, off Cape Borda, 2 poor; at 110 fathoms, off Beachport, 3 good and 9 moderate; at 130 fathoms, off Cape Jaffa, 2 poor, 21 poor and rolled; at 150 fathoms, off Beachport, 2 good, quite white; and at 200 fathoms, 2 valves, poor.

Its habitat seems to be just about Backstairs Passage from 15 to 22 fathoms, beyond which it is rare and dead.

This is the shell which Tate recorded as *Megerlia willemoesi*, Davidson, from 22 fathoms, in Encounter Bay (R. H. Pulleine), in Trans. Roy. Soc. of S. Austr., vol. ix., 1886, p. 110.

### *Jaffaria Magasella jaffaeensis*, Blochmann, *unpub.* //

I may add to the locality given by the author.

Dredged, all dead, off Cape Jaffa, at 90 fathoms, 35 large and small, and 24 very small; at 130 fathoms, 17 moderate size, 2 small; at 300 fathoms, 16 good, very small, and 6 very poor; at 110 fathoms, off Beachport, 4 good; at 150 fathoms, 8 moderate; at 200 fathoms, 8 moderate, 1 good, and 6 valves.

### *Megerlina Kraussina (Megerlina) lamarckiana*, Davidson. //

*Kraussia lamarckiana*, Davidson, Proc. Roy. Soc., Lond., 1852, p. 80, pl. xiv., figs. 22 and 23. *Type locality*—Sydney. H. and A. Adams, The Genera of Recent Mollusca, vol. ii., p. 579, 1858.

*Terebratula (Kraussia) lamarckiana*, Davidson; Reeve, Conch. Icon., pl. ix., fig. 34, 1861.

*Kraussina lamarckiana*, Davidson; Chenu, Man. de Conch., 1862, vol. ii., p. 206, fig. 1057; Tenison-Woods, Proc. Roy. Soc., Tasm., 1878 (1877), p. 57; Long Bay, Tasmania; Davidson, "Challenger" Rep. Zool., vol. i., 1880, p. 53, pl. iv., fig. 9.

Dredged alive off Cape Willoughby, Kangaroo Island, at 20 fathoms, 10 alive; at 17 fathoms, off Point Marsden, Kangaroo Island, 1 alive; at 62 fathoms, off Cape Borda, 1 dead; at 110 fathoms, off Beachport, 1 dead. Taken on the beach at Guichen, Holdfast, and Fowler Bays and on St. Francis Island.

### ***Kraussina atkinsoni*, Tenison-Woods.**

*Kraussia atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasm., 1878 (1877), p. 57. *Type locality*—Long Bay.

*Kraussina*, etc.; Davidson, Proc. Linn. Soc., Lond., 1887 (1886), p. 127, pl. xxi., figs. 5 and 6; Twelvetrees and Petterd, Proc. Roy. Soc., Tasm., 1900, p. 90, fig. 4; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 442.

Taken on the beach at Robe, and at Venus Bay, rare.

~~Doryprothecea~~ *Cistella australis*, Blochmann, *antea* ♂  
Dredged in 20 fathoms, off Cape Willoughby, Kangaroo Island, 7 alive.

### **EXPLANATION OF PLATES.**

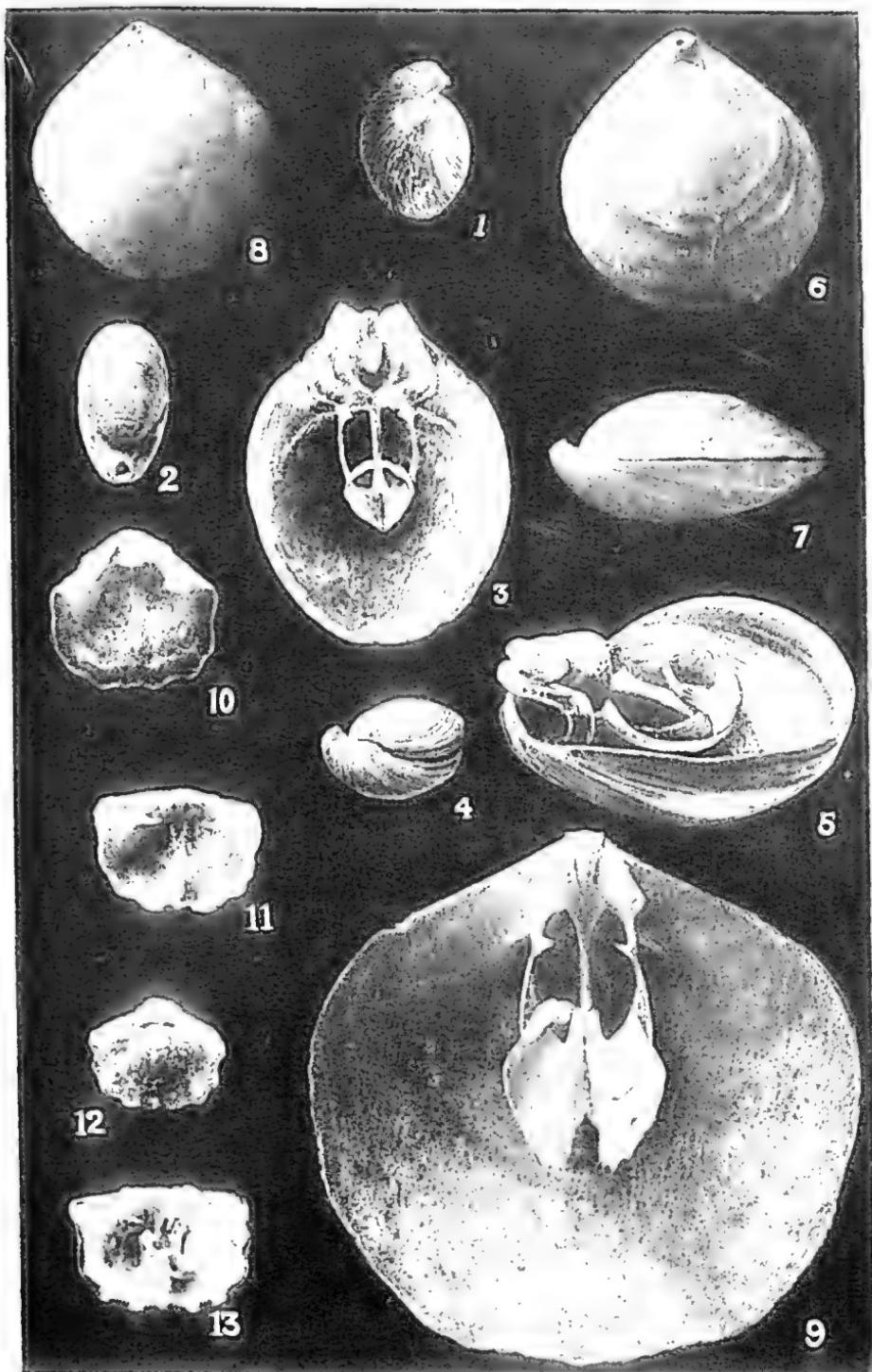
#### **PLATE XXVII.**

- |         |   |                                   |  |
|---------|---|-----------------------------------|--|
| Fig. 1. | <i>Magasella vercoi</i> , Blochmann,    | side view.                        |  |
| " 2.    | " "                                     | " dorsal view.                    |  |
| " 3.    | " "                                     | " interior.                       |  |
| " 4.    | " "                                     | " side view.                      |  |
| " 5.    | " "                                     | " inclined side view of interior. |  |
| " 6.    | <i>Magasella jaffensis</i> , Blochmann, | dorsal view.                      |  |
| " 7.    | " "                                     | " side view.                      |  |
| " 8.    | " "                                     | " dorsal view.                    |  |
| " 9.    | " "                                     | " interior.                       |  |
| " 10.   | <i>Cistella australis</i> , Blochmann,  | interior of ventral valve.        |  |
| " 11.   | " "                                     | " interior of dorsal valve.       |  |
| " 12.   | " "                                     | " dorsal view.                    |  |
| " 13.   | <i>cuneata</i> , Risso,                 | " interior, for comparison.       |  |

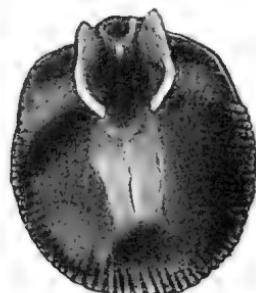
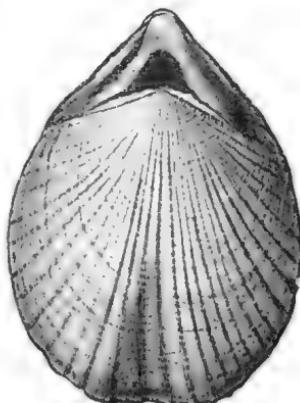
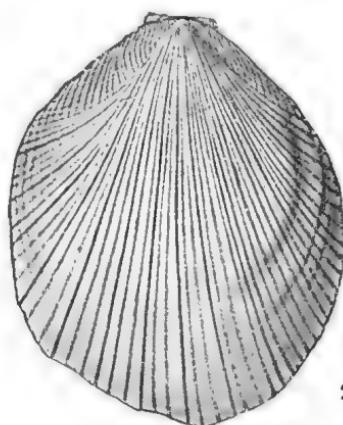
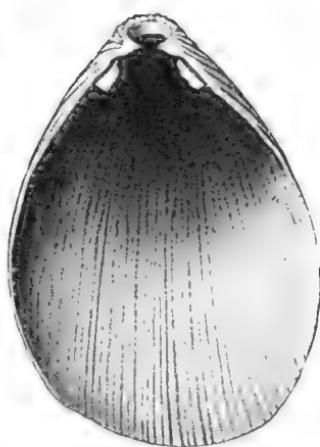
#### **PLATE XXVIII.**

- |         |                                      |                             |  |
|---------|--------------------------------------|-----------------------------|--|
| Fig. 1. | <i>Terebratulina cavata</i> , Verco, | ventral valve, interior.    |  |
| " 2.    | " "                                  | " dorsal valve, exterior.   |  |
| " 3.    | " "                                  | " ventral valve, side view. |  |
| " 4.    | " "                                  | " dorsal valve, side view.  |  |
| " 5.    | " "                                  | " brachial apparatus.       |  |
| " 6.    | <i>Magasella exarata</i> ," Verco,   | side view.                  |  |
| " 7.    | " "                                  | " dorsal view.              |  |
| " 8.    | " "                                  | " brachial apparatus.       |  |











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**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART XIII.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 4, 1910.]

**PLATES XXIX. AND XXX.**

This paper consists of full notes on the South Australian species of the genera *Scissurella*, *Schismope*, *Pyrene*, and *Turritella*, and of occasional notes on species belonging to several other genera.

I am indebted to Mr. Hedley, Mr. W. L. May, Mr. Gatliff, and Mr. Gabriel for specimens given or loaned and suggestions made. The usual difficulty was found in dealing with the mass of material in the genus *Pyrene*, owing to the variations in each species. Pace, in his preliminary paper on the *Columbellidae* (in Proc. Mal. Soc., London, 1902, vol. v., p. 39) regards the colour markings as of considerable value in distinguishing species, and I set myself the task of studying these very closely; but I cannot say they proved of very great or very definite use, though of some assistance. My conclusions are not altogether in accord with those of other Australian workers, and are intended rather as suggestions for further advances. I found great difficulty, too, in dealing with the deep-sea *Turritellas*, especially the larger forms belonging to the group of *T. runcinata* and *T. accisa*, Watson. He has several species from Australian waters which I cannot recognize with certainty, and my examples show so much variation in sculpture as to make splitting them up into species too dangerous, and to render their accurate description as varieties too difficult and laborious at present.

***Scissurella australis*, Hedley.**

*Scissurella australis*, Hedley, Memoirs Austr. Mus., 1903, part 6, vol. iv., p. 329, fig. 63. *Type locality*—"63 to 75 fathoms off Port Kembla, New South Wales." Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1910, vol. xxiii. (N.S.), part 1, p. 95, "off Wilson's Promontory."

Dredged in 130 fathoms off Cape Jaffa, 4 dead: in 150 fathoms off Beachport, 1 good; in 200 fathoms, 1 good: in 300 fathoms off Cape Jaffa, 4 dead. Identified by Mr. Hedley from his type.

***Scissurella obliqua*, Watson.**

*Scissurella obliqua*, Watson, "Chall." Reports, Zool., vol. xv., 1886, p. 116, pl. viii., fig. 5. *Type locality*—"Kerguelen Island"

shore." Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 58, pl. lxv., figs. 20 and 21; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903 (1902), vol. xv. (N.S.), part 2, p. 181, Victorian coast.

Gulf St. Vincent beach.

### Schismope atkinsoni, Tenison-Woods.

*Scissurella atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 149. *Type locality*—Blackman's Bay, Tasmania, 6 to 10 fathoms; G. F. Angas, Proc. Zool. Soc., London, 1878, p. 869, "Holdfast and Aldinga Bays." Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 66; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 407; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903 (1902), vol. xv. (N.S.), part 2, p. 181, Victorian coast; Hedley, Memoirs Austr. Mus., 1903, vol. iv., p. 329, off Port Kembla, New South Wales; also, Records Austr. Mus., 1905, vol. vi., part 2, p. 42; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 109, 100 fathoms off Cape Pillar, Tasmania.

*Schismope carinata*, Watson, "Chall." Reports, Zool., 1886, vol. xv., p. 119, pl. viii., fig. 6. *Type locality*—Port Jackson, also off Cape York, North-East Australia. Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 68, pl. lxv. (lxviii.), figs. 17 to 19.

This is a very variable little shell in its sculpture. There may be no carination except that of the slit fasciole (is this *S. tasmanica*, Petterd, Jour. of Conch., 1879, p. 104; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 407, pl. xxiv., fig. 23?), or only one keel, or two or three. The spiral liræ around the umbilicus may be valid, when the three keels are marked, continuing their series as lesser keels to the edge of the umbilicus; or they may be distinct and lamellose when the keels are absent. Spiral striae are present from suture to umbilicus, and these vary much in their visibility. Then the axial striae are sometimes obsolete, sometimes rather distant, sometimes distinct, crowded, and erect, especially between the suture and the slit fasciole, but also sometimes between the keels at the base.

Dredged in 20 fathoms Investigator Strait, 1 alive; Gulf St. Vincent, depth unrecorded, 13 alive and dead; 35 fathoms off St. Francis Island, 2 good; 55 fathoms off Cape Borda, 11 dead; also 62 fathoms, 4 dead.

### Schismope beddomei, Petterd.

*Schismope Beddomei*, Petterd, Jour. of Conch., 1884, vol. iv., p. 139, No. 16.

This species was recorded in Adcock's Handlist of the Aquatic Mollusca of South Australia, 1893, No. 375, p. 9, and in the Report of the Malacological Section of the Royal Society of South Australia in Trans. Roy. Soc., South Australia, 1906, vol. xxx., p. 367, No. 49. I cannot confirm this

record. The species is not represented in Tate's cabinet or mine by shells collected in South Australia.

**Schismope pulchra**, Petterd.

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*Schismope pulchra*, Petterd, Jour. of Conch., 1884, vol. iv., p. 139, No. 17. *Type locality*—Tasmania, North-West coast. Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 68; Hedley, Proc. Linn. Soc., New South Wales, 1900, vol. xxv., part 4, p. 726, fig. 5; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, page 407; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903 (1902), vol. xv. (N.S.), part 2, page 182, Western Port; also, *op. cit.*, 1906, vol. xviii., part 2, p. 65; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 109, 100 fathoms off Cape Pillar, Tasmania.

Taken on beach at Robe and Venus Bay. Dredged in Gulf St. Vincent, 5 good; in 35 fathoms off St. Francis Island, 1; in 55 fathoms off Cape Borda, 16 dead; in 110 fathoms off Beachport, 4 good; in 150 fathoms off Beachport, 2 good.

**Leiostraca joshuana**, Gatliff and Gabriel.

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*Leiostraca joshuana*, Gatliff and Gabriel, Proc. Roy. Soc., Victoria, vol. xxiii. (N.S.), part 1, 1910, p. 83, pl. xviii., fig. 4. *Type locality*—San Remo.

Dredged in 5 fathoms in Gulf St. Vincent, 37 living and dead.

**Vanikoro quoyiana**, A. Adams.

*Vanikoro quoyiana*, A. Adams, Proc. Zool. Soc., London, 1853, p. 175, pl. xx, fig. 4. *Type locality*—Clusan; Angas, Proc. Zool. Soc., London, 1867, p. 212, No. 163, Port Jackson; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 197, "Hobson's Bay."

This name is given by E. A. Smith as a synonym of *V. gaimardi*, H. and A. Adams (Genera Moll., 1858, vol. i., p. 375), in Proc. Mal. Soc., London, 1908, vol. viii., No. 2, p. 108. It was placed as *V. quoyi*, Adams, as a synonym of *V. Orbignyani*, Recluz, by Tryon, Man. Conch., 1886, vol. viii., p. 70; but E. A. Smith denies their identity. As *V. Orbignyani*, Recluz, it is recorded from Tasmania by Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 376. As *Narica ligata*, Recluz, it is recorded for South Australia in Adcock's Handlist of Aquatic Mollusca, 1893, p. 6, No. 176.

Taken on the beach at Aldinga and Fowler Bay by Tate. Dredged in 20 fathoms Yankalilla, 6 alive on 1 piece of polyzoan coral; dead in 40 fathoms off Beachport, 2; in 45 fathoms east of Neptune Island, 1; in 55 fathoms off Cape Borda, 74 quite fresh but very small; in 62 fathoms, 4; in 110 fathoms off Beachport, 1 poor; in 130 fathoms off Cape

Jaffa, 2 poor; in 150 fathoms off Beachport, 1 poor. It is evidently alive in water up to 55 fathoms.

The protoconch is prominent, consisting of three well-rounded whorls, of which the first two are smooth, the third gradually develops four spirals of tiny tubercles. It ends abruptly, and then the very bold axial costate sculpture of the spire-whorls begins. The protoconch may be wholly light-brown or only its third whorl.

### *Vanikoro vincentiana*, Angas.

*Adeorbis Vincentiana*, Angas, Proc. Zool. Soc., London, 1880, p. 417, pl. xl., fig. 9. *Type locality*—Aldinga Bay, Gulf St. Vincent. Tate, Trans. Roy. Soc., South Australia, 1880, vol. iii., p. xlix.; Pilsbry, Tryon, Man. Conch., 1888, vol. x., p. 86, pl. xxx., fig. 100; Adecock, Handlist Aquatic Moll., South Australia, 1893, p. 8, No. 292; Pritchard & Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xiii. (N.S.), part 1, p. 140, "Sorrento"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 390, "Devonport," Tasmania; also p. 458, description of protoconch and young shell.

*Vanikoro vincentiana*, Angas, E. A. Smith, Proc. Mal. Soc., London, 1908, vol. viii., p. 116.

*Vanikoro denselaminata*, Vereo, Trans. Roy. Soc., South Australia, 1909, vol. xxxiii., p. 334, pl. xxix., figs. 1, 2, and 3. Mr. Gatliff has suggested that this is the juvenile state of *V. vincentiana*, Angas, as may also be gathered from Tate and May's note, and this is confirmed by my examination of a series of Angas's species: so I place my name as a synonym and add the following observations:—Some examples show spirals in the whorl immediately following the protoconch, in others these are obsolete. In the later portions of the adult shell, the axials become obsolete, and crowded spirals may become quite valid.

Taken on the beach at Reevesby Island, Spencer Gulf, and St. Francis Island. Dredged in Backstairs Passage and Gulf St. Vincent, depth unrecorded. It appears to be a comparatively shallow water form, not having been taken by me at any greater depth than 22 fathoms.

### *Turritella subsquamosa*, Dunker.

*Turritella subsquamosa*, Dunker, Malak. Blatter, vol. xviii., p. 152. *Type locality*—Bass Strait; Hedley, Memoirs Austr. Mus., vol. iv., part 6, 1903, p. 347, off coast of New South Wales in 40 to 100 fathoms; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), part 2, p. 53, Victorian coast; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 110, 100 fathoms off Cape Pillar, Tasmania.

*Turritella lamellosa*, Watson, Jour. Linn. Soc., 1880, vol. xv., p. 229. *Type locality*—38 to 40 fathoms off East Moncoeur Island, Bass Strait. "Chall." Reports, Zool., vol. xv., 1886, p. 474, pl. xxix., fig. 6; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 203; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 378.

*Turritella acuta*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 143. *Type locality*—Long Bay, Tasmania (*non* M. C. Mayer, 1859, Jour. de Conch., vol. vii., p. 298, pl. xi., fig. 7); (*Torcula*), Tryon, Man. Conch., 1886, vol. viii., p. 206, pl. lxiv., fig. 10; Kobelt, Conch. Cab. (Ed. Küster), 1897, Band i., Abt. xxvii., p. 56, No. 70, pl. xviii., fig. 5; Adcock, Handlist Aquatic Moll. of South Australia, 1893, p. 6, No. 189; recorded for South Australia.

*Turritella oxyacris*, Tate (*nom. mut.*), Trans. Roy. Soc., South Australia, 1897, vol. xxi., p. 41; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 202; recorded for Victoria.

Dredged alive in 20 and 22 fathoms in Backstairs Passage, and in 20 fathoms Gulf St. Vincent. Dredged dead from 13 fathoms upwards; in 40 fathoms off Beachport, 60 large and small, mostly worn; in 55 fathoms off Cape Borda, 57, up to an inch long; in 110 fathoms off Beachport, 16 in moderate condition; in 130 fathoms off Cape Jaffa, 6 very poor; in 200 fathoms off Beachport, 1 fragment. It appears to live at about 20 fathoms, not in the very shallow nor in the very deep water. Some of the shells from 40 fathoms have axial lines, about 16 in a whorl, which seem like cracks in the deeper layer of the shell substance, and become visible as the outer scabrous covering is worn off.

On the base there may be as many as twelve distinct spiral lines, or only three or four obsolete threads near the periphery. Generally three or four larger threads encircle the middle third of the spire-whorls; sometimes twelve or fourteen of nearly equal size are distributed over the whorl. The peripheral cord may be very stout, and project considerably beyond the suture, so imbricating the whorl below; or it may not project at all, and the whorls may be uniformly sloping or distinctly convex.

#### *Turritella clathrata*, Kiener.

*Turritella clathrata*, Kiener, Icon. Coq. Viv., p. 38, pl. xiv., fig. 1. *Type locality*—Shores of New Holland. Reeve, Conch. Icon., 1849, vol. v., pl. viii., fig. 37; (*Torcula*), Tryon, Man. Conch., 1886, vol. viii., p. 206, pl. lxiv., fig. 2; Kobelt, Conch. Cab. (Ed. Küster), Band i., Abt. xxvii., 1897, p. 26, No. 32, pl. vi., fig. 5, and pl. vii., fig. 5; Adecock, Handlist of Aquatic Moll., South Australia, 1893, p. 6, No. 190, recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 202, "South-west Victorian coast"; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 378, recorded for Tasmania.

Kiener in his description and plate represents the species as quite smooth. But actually besides the two prominent keels there are seven to ten spiral striae, generally one more above the carina than below. In addition there are, crossing these, very fine lamellar striae, following the curve of the

border of the aperture. So also the base, which he gives as smooth, has crowded fine curving radial growth lamellæ, crossing about a dozen concentric spiral striae. He figures rightly the two spiral ribs as about equal; the central is usually more salient, but in different specimens it may be less and less valid until it is no more than a distinct angulation. In other individuals the lower, supra-sutural, spiral cord, which is usually quite valid and imbricating, may be less marked and even absent, only the prominent central carina remaining. In one example, three whorls in the middle of the shell are markedly medially angulate, and not only lack the suprasutural cord, which is present in the earlier whorls, but are quite constricted here, and afterwards the cord gradually appears in the whorls below. The protoconch of two smooth glistening whorls with its pointed apex and the earlier spire-whorls are so alike in this species and *T. subsquamosa*, Dunker, that the tips of the two are indistinguishable from each other. Kiener's type had a length of 48 mm., but the species may attain 53 mm. As Tryon says, there are obscure oblique fulvous stripes over the whorls with spots on the paler keels; but sometimes the living shell is of a uniform dark-purplish-brown, with lighter brown encircling ribs.

It is taken along all the South Australian coast as far west as Point Sinclair. Dredged alive in 20 fathoms in Gulf St. Vincent, and at all shallower depths; dead in 35 fathoms off St. Francis Island, 3 very poor; and in 45 fathoms off Neptune Islands, 1 poor, half an inch long. It evidently does not inhabit such deep water as its very close ally *T. subsquamosa*, Dunker.

### *Turritella kimberi*, Verco.

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*Turritella kimberi*, Verco, Trans. Roy. Soc., South Australia, 1908, vol. xxxii., p. 342, pl. xv., figs. 14 and 15. Type locality—Backstairs Passage.

Dredged in Gulf St. Vincent, 1 good; and in 15 to 20 fathoms off St. Francis Island, 1 good.

### *Turritella neptunensis*, n. sp. Pl. xxx., fig. 7.

293

Shell imperfect, elongate-turreted, of twelve whorls, including a papillate protoconch with a projecting apex, of three convex whorls, the first two smooth, the third faintly axially striate. The following six spire-whorls are markedly medially angulate and minutely carinate, otherwise smooth. The next two whorls become quite convex, and have about seven obsolete flat spiral liræ, most marked near the carina, which forms the central and largest one. The rest of the shell is broken

away. Suture distinct, faintly margined. The accremental striae indicate a slightly concave outer lip.

*Dim.*—Length, 6 mm.; breadth 1·4 mm.

*Locality*.—Type dredged in 104 fathoms 35 miles southwest of Neptune Islands, with three others, all imperfect.

*Diagnosis*.—Though incomplete, its characters are so distinct as to readily separate it from all other South Australian forms. It resembles *T. kimberi*, Verco, in its long narrow form, its simple mouth and spiral striae; but *T. kimberi* has a very acute apex, its whorls are all convex, and its spirals are narrower and higher. It differs from *T. atkinsoni* in its smaller size, narrower form, and the roundness of its later whorls.

Type in my collection.

#### ***Turritella smithiana*, Donald.**

*Turritella (Colpospira) Smithiana*, Donald, Proc. Mal. Soc., London, 1900, vol. iv., p. 55, No. 1, pl. v., figs. 1 and 1c. *Type locality*, 410 fathoms off Sydney. Hedley, Memoirs Austr. Mus., 1903, vol. iv., part 6, p. 349, is "not Australian, but probably an Atlantic form"; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 110, in 100 fathoms off Cape Pillar, Tasmania; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1909, vol. xxii. (N.S.), part 1, p. 39, San Remo.

Dredged in 130 fathoms off Cape Jaffa, 1 good: in 150 fathoms off Beachport, 1: in 200 fathoms, 1: in 300 fathoms, 32 good, but all dead.

#### ***Turritella mediolevis*, n. sp. Pl. xxx., figs. 5 and 6.**

300

Shell small, elongately-turreted, narrow, of eleven whorls, including a slightly eccentric protoconch of two convex smooth whorls. The spire-whorls at first are flat and sloping, but later gradually become more convex, until they are quite round. The suture is distinct, subcanaliculate in the earlier part. The base is round. Aperture nearly round, widely effuse in front. Outer lip thin, with a deep central sinus; inner lip thin, rather expanded over a minute perforation. The upper spire-whorls are smooth but for two indistinct bands, one below and one above the suture. In the fifth whorl each of the bands divides into two, and these increase in number in successive whorls, leaving the central part smooth (whence the specific name) but gradually narrowing, until in the penultimate there are about eight somewhat unequal low flat spirals encircling the whole surface. In the body-whorl there are about fifteen flat spirals from the suture to the base of the shell. They are crossed by sinuous axial striae, shaped like the outer lip. Colour white, light-brown at the base and below the suture.

*Dim.*—Length, 5·2 mm.; breadth, 1·5 mm.; another example of thirteen whorls is 6·2 mm. long.

*Locality.*—Type, 62 fathoms off Cape Borda, with very many others; and at 55 fathoms, 2; in 40 fathoms off Beachport, many; in 104 fathoms off the Neptunes, many.

*Diagnosis.*—From *T. smithiana*, Donald, by the smooth upper whorls and the more numerous and less valid spirals in the later whorls; from *T. kimberi*, Verco, by the blunt two-whorled protoconch; from *T. accisa*, Watson, by its narrower smaller form, its more convex later whorls and their less valid spirals.

Type in my collection.

### *Llyptozaria* *Turritella opulenta*, Hedley. 302

*Turritella opulenta*, Hedley, Records of Austr. Mus., 1907, vol. vi., part 4, p. 292, pl. liv., fig. 9. *Type locality*—80 fathoms off Narrabeen, New South Wales. Hedley and May, *op. cit.*, 1908, vol. vii., No. 2, p. 110; 100 fathoms off Cape Pillar, Tasmania.

Dredged in 55 fathoms off Cape Borda, 6 small, good; identified from specimen sent by Mr. May from Cape Pillar.

### ✓ 296 *Turritella runcinata*, Watson. 296

*Turritella runcinata*, Watson, Jour. Linn. Soc., vol. xv., 1881, p. 217. *Type locality*—38 to 40 fathoms off East Monceour Island, Bass Strait. "Chall." Reports, Zool., vol. xv., 1886, p. 475, No. 14, pl. xxx., fig. 3; Miss Donald, Proc. Mal. Soc., London, 1900, p. 47, pl. v., figs. 7 and 7a; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 203; Verco, Trans. Roy. Soc., South Australia, 1907, vol. xxxi., p. 308, pl. xxix., fig. 14, of the radula.

Watson's dimensions are: Height, 1·25 in.; breadth, 0·4 in.; least, 0·38; but they may reach 1·8 in. by 0·5 in.

The colour may be a deep uniform chestnut-brown or a pure white with light-brown apex, and spots and flecks of light-yellowish-brown. There is also a lilac-tinted variety, with a pale diffused broad lilac band over the central third, extending sometimes as far as the lower suture.

This species is quite common as a dredged shell. It has been taken in 16 fathoms, and at all greater depths up to 23 fathoms, in Gulf St. Vincent and Backstairs Passage, alive and dead 106 examples; in 25 fathoms Thorny Passage, 5 good up to 20 mm.; in 35 fathoms off St. Francis Island, 22 good; in 40 fathoms off Beachport, over 800 mostly immature, but ranging up to 37 mm.; in 55 fathoms off Cape Borda, 640 with some hundreds of tips; in 62 fathoms off Cape Borda, 82 good up to 25 mm.: in 90 fathoms off Cape

Jaffa, 16 up to 15 mm. and over a hundred tips; in 110 fathoms off Beachport, 1 adult and 191 up to 20 mm.; in 130 fathoms off Cape Jaffa, 42 up to 7 mm.: in 150 fathoms off Beachport, 17 up to 15 mm.; in 200 fathoms off Beachport, 8 poor and small. The finest examples, as to size and condition, are found in water from 15 to 25 fathoms; beyond that depth, though much more abundant, they are immature or smaller.

**Turritella accisa**, Watson. *Trans. Nat.*

*Turritella accisa*, Watson, Jour. Linn. Soc., London, 1881 (1800), vol. xv., p. 220. *Type locality*--Off East Moncoeur Island, Bass Strait, 38 to 40 fathoms; also "Chall." Reports, Zool., 1886, vol. xv., p. 476, No. 15, pl. xxx., fig. 4; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900 (1899), vol. xii. (N.S.), part 2, p. 203; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 379; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 110, in 100 fathoms off Cape Pillar, Tasmania.

*Turritella higginsi*, Petterd, Jour. Conch., 1884, p. 135. *Type locality*--Tamar Heads, Tasmania, *teste* Tate and May, loc. cit.

Dredged in 40 fathoms off Beachport, 211 of all sizes to adult; in 55 fathoms off Cape Borda, 3 young fresh, 3 adult perfect; in 62 fathoms off Cape Borda, 69 quite fresh up to full grown and 9 perfect adult; in 90 fathoms off Cape Jaffa, 24 good, well coloured, 32 immature; in 110 fathoms off Beachport, 22 good adult, 28 immature; in 130 fathoms off Cape Jaffa, 11 immature; in 150 fathoms off Beachport, 23 in moderate condition up to adult, 16 immature fresh; in 200 fathoms off Beachport, 11 poor and immature. The *habitat* of this species differs somewhat from that of *T. runcinata*, Watson, which attains its maximum size and is abundant in water from 15 to 25 fathoms. *T. accisa* has not been taken by me at shallower depths than 40 fathoms: it did not accompany *T. runcinata* in 35 fathoms off St. Francis Island.

**Turritella circumligata**, n. sp. Pl. xxx., figs. 3 and 4. 299

Shell solid, of thirteen whorls, including a protoconch of two smooth convex whorls with a prominent round apex. The first three spire-whorls are smooth but for faint growth lines, and are very slightly convex. The fourth has four spiral cords very faintly marked, which become very stout in the later whorls. The suprasutural cord, the strongest, is round and projects beyond the suture, so as to imbricate the shell; the infrasutural is as wide, but not so high, and slopes from the suture: close to this cord is a much narrower and less prominent one, and further removed from this and closer to the suprasutural cord is another round spiral. In the last

two whorls a fifth small cord appears above the suture. The base is flatly rounded, with five flat low spiral cords. The aperture is squarely round, slightly effuse near the columella, which is curved: inner lip, a broad glaze; outer lip simple, smooth inside, corrugated outside by the spirals, with a deep broad sinus well rounded at its depth between the two smaller cords; growth lines corresponding in outline with the outer lip constitute the only other sculpture. It has a pale-yellow-brown tint, with darker brown spirals between the cords, and a broad brownish spiral over the middle of the base.

*Dim.*—Length, 17 mm.; breadth, 6 mm.

*Locality*.—Type in 110 fathoms off Beachport, with 11 others good; in 150 fathoms, 8 poor; in 130 fathoms off Cape Jaffa, 9 good.

It may reach 22·5 mm. in length. The suprasutural and infrasutural cords may each split in the later whorls at its upper part to form a small secondary spiral.

*Diagnosis*.—Its alliance is with *T. australis*, Lam., from which, however, it differs in its more numerous and non-tuberculate spirals; from the Tasmanian variant, *T. granulifera*, Tenison-Woods, it differs in the absence of nodulation, and the relative disposition of the ribs, and of numerous spiral threadlets. It is of interest to note that neither of these forms is found in South Australian waters, though taken at Western Port, Victoria, and in Tasmania abundantly.

Type in my collection.

*Stereocolpus medisangulata*  
*Turritella atkinsoni*, Tate and May.

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*Turritella tasmanica*, Tenison-Woods (*non Reeve*), Proc. Roy. Soc., Tasmania, 1877 (1876), p. 140. *Type locality*—Long Bay, Tasmania.

*Turritella atkinsoni*, Tate and May (*nom. mut.*), Trans. Roy. Soc., South Australia, 1900, p. 95; also Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 378, pl. xxiii., figs. 15, 16, and 17; Gathiff and Gabriel, Proc. Roy. Soc., Victoria, 1909, vol. xxii. (N.S.), part 1, p. 38, Bass Strait

Var. *Turritella godeffroyana*, Donald, Proc. Mal. Soc., London, 1900, vol. iv., p. 53, No. 3, pl. v., figs. 6 and 6a. *Type locality*—Bass Strait. Tate and May regard this shell, which Miss Donald described as a new species, as a variety of Tenison-Woods' species; and Hedley, in Memoirs Aust. Mus., 1903, vol. iv., part 6, p. 349, points out that her name has some months' priority over that of Tate and May.

Dredged in 90 fathoms off Cape Jaffa, 1; in 110 fathoms off Beachport, 2; in 130 fathoms off Cape Jaffa, 2; in 150 fathoms off Beachport, 15 good up to 16 mm. in length; in 200 fathoms off Beachport, 2 good.

*Stirocolpus* 302A

*Turritella atkinsoni*, Tenison Woods, var. *médioangu-*  
*lata*, n. var. Pl. xxx., figs 8 and 9.

Shell rather thin, turriculate, of twelve whorls, including a slightly mamillate blunt protoconch of two convex smooth whorls. Suture distinct, linear. Whorls medially strongly angulate and feebly carinate, sloping to both sutures, concavely to the lower, and feebly swollen midway to the upper. The first and second whorls are bicarinate, the lower carina is the rather less valid and gradually decreases to an obsolete spiral stria.

In successive whorls new striae arise, so that in the penultimate there are three in the upper and four in the lower half of the whorl, but all obsolete. The body-whorl has a round cord-like carina forming the periphery at the suture, beyond which the base is nearly flat, slightly concave, and with numerous sublenticular spiral striae. Aperture roundly hexagonal, with a wide effuse base; outer lip thin, roundly angled at its centre (the carina ceasing some distance from it), with a wide deep sinus having its centre at the angulation. Columella curved. Colour yellowish-brown, lighter along the suture, the earlier whorls translucent-white, tinted brownish along the angulation.

*Dim.* — Length, 12·9 mm.; breadth, greatest 3·6 mm., least 3 mm.

*Locality*.—Type in 104 fathoms 35 miles south-west of Neptune Island, with more than 80 others; in 110 fathoms off Beachport, 7 fresh, 4 poor; in 150 fathoms, 39 good; in 200 fathoms, 29 large but poor, only 2 good; in 90 fathoms off Cape Jaffa, 24 good and alive, 55 small; in 300 fathoms, 15 poor and small. It would seem, therefore, to favour 90 to 200 fathoms, and to be essentially a deep-water form. I have not taken a specimen at any less depth.

*Variations*.—It may reach a length of 17·75 mm. and have fourteen whorls. The angulation may be provided with a distinct carinating cord. One of the spiral striae just behind this may also become a valid cord, and together with these, in other specimens, the peripheral spiral may appear just above the suture, with another valid spiral close behind it. These differences suggest conspecificity with *T. atkinsoni*, Tenison-Woods, although my typical shell, and the boldest-ribbed examples of his species, are very unlike. But he described his type as having "two principal keels": *T. godeffroyana*, Donald, has three, and Tate says *T. atkinsoni* has four. The two figures drawn by Tate and May in Proc. Linn. Soc., New South Wales, *loc. cit.*, show two very dissimilar forms,

and my figure gives an extremely aberrant variety of the same species.

Type in my collection.

*Strebloceras cygnicollis*, Hedley.

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*Strebloceras cygnicollis*, Hedley, Proc. Linn. Soc., New South Wales, 1904, part 1, p. 189, pl. viii., figs. 12 to 14. *Type locality*—Port Jackson. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), part 2, p. 56, recorded for Victoria.

Dredged in 55 fathoms north-west of Cape Borda, 4 alive, 1 dead.

The smooth glassy embryonic portion beyond the marked varix is not equally thin-walled throughout, but the spire and the proximal fifth are solid, and then the very thick walls gradually thin towards the varix.

+ 6 = 150 *Triphora tasmanica*, Tenison-Woods. *Var. lilacina*, Verco; *var. aureovincta*, Verco,

This exquisitely pretty little shell was taken in perfect condition in 55 fathoms off Cape Borda.

It has a golden band like *T. regina*, Hedley, but instead of colouring the most anterior spiral of pearls, it ornaments the smooth spiral plait in front of this, and so is found in the suture and on the base of the body-whorl. Its protoconch is that of *T. tasmanica*, and has not the spicular form of *T. regina*. It is very deeply-coloured purple, like the var. *lilacina*, Verco. One example, perfect, of eight whorls, was taken.

Type in my collection.

*C A U T O R*

*Triphora novapostrema*, n. sp. Pl. xxx., figs. 1 and 2. 365

Shell immature, of eight whorls, including the protoconch of two whorls, the first nearly smooth with a round projecting apex, the second with two stout prominent keels, gradually becoming nodular. In the first spire-whorl arises a faint third spiral, posterior to the others (whence the specific name), which continuously enlarges till it nearly equals them in size. They are crossed by axial liræ, about fourteen in the last whorl, both axials and spirals being well marked, the latter the stouter, and being tuberculate at their intersection. The peripheral spiral is prominent and subtuberculate, it is visible in the earlier sutures, but not in the later: two flat obsolete plaits curve round the base. Colour white.

*Dim.*—Length, 3·1 mm.; breadth, 1·2 mm. The largest example, immature, is 5·2 mm.

*Locality*.—Dredged in 55 fathoms off Cape Borda, type with 7 others, some quite fresh, all immature: in Gulf St. Vincent, 1.

*Diagnosis.*—Its special characters are its blunt protoconch with two carinae, and the third spiral arising behind the others; in most *Triphora* it arises between them as in *T. angasi*, *tasmanica*, *cana*, etc.

Type in my collection.

*Euplica bidentata* 623  
*Pyrene versicolor*, Sowerby.

*Columbella versicolor*, Sowerby, Proc. Zool. Soc., London, 1832, p. 119. Type locality—Annaa, Philippine Islands (Cuming). Sowerby, Thes. Conch., vol. i., 1857, p. 117, sp. 18, pl. xxxvii., figs. 41-46; Reeve, Conch. Icon., 1858, pl. xi., figs. 51 *a* and *b*; Angas, Proc. Zool. Soc., London, 1867, p. 194, New South Wales; Tryon, Man. Conch., vol. v., 1883, p. 110, pl. xlvi., figs. 84-96; (*Pyrene*) Hedley, Australasian Association for the Advancement of Science, 1909, Queensland.

*Columbella scripta*, Lamarck, Hist. Nat. Anim., sans Vert., ed. 2, vol. x., p. 270 (*non* Linn.).

*Columbella bidentata*, Menke, Moll. Nov. Holl., 1843, p. 23, No. 108; Sowerby, Thes. Conch., vol. i., 1847, p. 118, sp. 21, pl. xxxvii., figs. 53 and 54.

*Columbella arenosa*, Kiener; *coronata*, Duclos; *athadona*, Duclos; *tigrina*, Duclos; *aspera*, Sowerby; *nivosa*, Reeve; *per-tusa*, Reeve, are synonyms, according to Tryon (*loc. cit.*).

This species, a tropical form, appears to come some distance down the Eastern coast of Australia, but not to reach Victoria or Tasmania. It is found along the Western coast of Australia, and at Albany on the southern coast. I have a recent shell from St. Francis Island, and Dr. Torr one from Wool Bay.

At Murat Bay, in a subfossil form in a kind of conglomerate on the beach, they are found in great numbers bearing their colour markings with *Meleagrina fimbriata*, Dunker, and *Barbatia trapezia*, Deshayes, neither of which is found in our waters alive, and in the same condition they occur along the South Australian coastline to the east.

### *Pyrene varians*, Sowerby, 1832, p. 118.

*Columbella varians*, Sowerby, Proc. Zool. Soc., London, 1832, p. 118. Type locality—Gallapagos Island (Cuming). Thes. Conch., 1857, vol. i., p. 117, pl. xxxvii., figs. 47 to 50; Reeve, Conch. Icon., 1858, pl. xvii., sp. 91; Tryon, Man. Conch., vol. v., 1883, p. 110, pl. xlvi., figs. 97 and 2, and pl. xlvi., figs. 3, 5, and 6, also "Philippines and New Guinea"; Hedley, Australasian Association for the Advancement of Science, Brisbane, 1909, p. 368, recorded for Queensland.

In Tate's cabinet is an example from Wauralti, in Spencer Gulf, named and its locality certified by himself. I have not yet taken it on the South Australian coast, nor has any other collector to my knowledge.

*Lemnitrella* 128

*Pyrene semiconvexa*, Lamarck. 596

*Buccinum semiconvexum*, Lamarck, Hist. Nat. Anim. sans Vert., 1822, vol. vii., p. 272, no fig., locality unknown; Sowerby, Thes. Conch., vol. i., 1847, p. 127, sp. 45, pl. xxxviii., figs. 103 and 104, "Port Lincoln, Australia."

Var. *C. strigata*, Reeve, Conch. Icon., 1859, vol. xi., pl. xxv., fig. 154, locality unknown.

Var. *rosacea*, Reeve, Conch. Icon., 1859, vol. xi., pl. xxix., fig. 183, locality unknown.

Var. *Yorkeensis*, Crosse, Jour. de Conch., 1865, p. 55, pl. ii., fig. 6. Type locality—Yorke Peninsula.

Dredged alive in 12 fathoms, and immature alive up to 22 fathoms Backstairs Passage.

There may be no markings, the shell being wholly white, or yellow, or rose-tinted, or whitish-purple, or dark-brown. There may be zig-zag axial red-brown markings throughout, or throughout the spire and just below the suture on the last whorl, the rest unicoloured. An infrasutural and a peripheral narrow articulated white-and-brown band may encircle it, the rest uniformly brown, or minutely white spotted. It may be dark-brown, almost uniformly punctuated with white; or dark-brown with a rather wide infrasutural white articulated band, and beyond this crowded spirally elongate narrow arrow-headed interrupted brown lines, forming a spiral reticulate pattern, recalling *C. dictua*, Tenison-Woods.

*Lemnitrella*

*Pyrene austrina*, Gaskoin.

600

*Columbella austrina*, Gaskoin, Proc. Zool. Soc., London, 1851, p. 9. Type locality—Australia. Reeve, Conch. Icon., vol. xi., 1858, pl. xix., fig. 100, Australia; Tryon, Man. Conch., vol. v., 1883, p. 126, pl. xlvi., fig. 99; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi., p. 198, Victoria; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., p. 365, Tasmania.

Dredged alive in 10 to 12 fathoms off Rapid Head, 1; and in 17 fathoms Investigator Strait, 2; occurring all along the coast; abundant and large on the shore of St. Francis Island: taken at Rottnest, Western Australia. Neither Angas nor Hedley records it for New South Wales, but it is found in Tasmania and Victoria. How far north does it extend along the Eastern and Western Australian shores?

*Lemnitrella*

*Pyrene menkeana*, Reeve. 595

*Buccinum acuminatum*, Menke (non Col. *acuminata*, Nuttall), Moll. Nov. Holl., 1843, p. 20, No. 87.

*Columbella menkeana*, Reeve, Conch. Icon., 1858, vol. xi., pl. xiv., figs. 69a and b. Type locality—Australia.

*Columbella (Mitrella)*, Angas, Proc. Zool. Soc., London, 1865, p. 166, "Gulf St. Vincent"; Tryon, Man. Conch., 1883, vol. v.,

p. 120, pl. xlviii., fig. 66; Kobelt, Conch. Cab. (Ed. Küster), Band 3, 1897, Abt. i.b, p. 110, No. 89, pl. xvi., figs 12 to 14; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 198, Victorian coast; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 365, Tasmania.

*Columbella xavieriana*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 134. Type locality—North coast, Tasmania (*Mitrella*); Tryon, Man. Conch., 1883, vol. v., p. 137, pl. li., fig. 50; Kobelt, Conch. Cab. (Ed. Küster), 1897, Band iii., Abt. i.e, p. 213, pl. xxix., fig. 10.

Some are uniformly light-brown, with a broad infrasutural band, well defined anteriorly, articulated blackish-brown and white; the white areas may be the larger, or the brown, or both may be very narrow and numerous. The white areas may consist of white dots. In addition to the infrasutural band there may be a very distinct narrow peripheral articulated white-and-brown spiral line, its spots varying much in length. The infrasutural white areas may extend down to this line, the brown being of their usual extent, or these may reach it as well. These areas may both be continued from the suture obliquely to the extreme end of the shell, and be united in a narrow brown area behind the notch (*P. xavieriana*, T. Woods). In these last two variations the brown may be more or less completely flecked with tiny white dots. The shell may be uniformly light-brown, or very light-brown or white, with a narrow brown-black line immediately above the suture, and encircling the body-whorl, or pure white. The shell may be very pale-brown, flecked all over with white dots, and have two broad delicate purple spiral bands, one just below the centre of the spire-whorls, the other below the periphery of the body-whorl; or there may be an infrasutural narrow articulated band, then a light-brown band, then the purple band, then a peripheral brown band, then the basal purple band. This purple variety, which is an exquisitely pretty shell, I call var. *purpureocincta*.

Taken along the whole of the South Australian coast-line. Dredged alive in 9 and 12 fathoms Gulf St. Vincent; 15 fathoms Point Marsden; dead in 17 fathoms Backstairs Passage, several, and in 20 fathoms; in 25 fathoms Thorny Passage, 2 fresh; in 40 fathoms off Beachport, 6 nearly bleached: none at greater depths. It is plainly a shallow-water form.

*Zemitrrella*  
**Pyrene axiaerata**, n. sp. Pl. xxix., fig. 4. 599

Shell fusiform, spire elate, apex subacute, whorls seven, feebly convex. Sutures distinct, simple. Shell immature,

mouth not formed. Last whorl much compressed at the base, with a rather long contracted snout. Aperture narrowly oval, canal short, feebly sinistral. Columella slightly convex, and originating about fifteen oblique spiral liræ to curve over the back of the snout. Almost smooth: sublenticular accremental, and spiral striæ.

Glistening. First four whorls faintly pink, diminishing from the apex; ground colour a bluish-gray: ornamented with bronze- or amber-coloured axial bands, slightly narrower than their interspaces, about twelve to a whorl, from suture to suture, splitting into three or four threads forming a spiral band of hair lines below periphery, and then continued as fewer and rather wider flames over the base.

*Dim.*—Length, 10·4 mm.; breadth, 3·7 mm.

*Locality.*—Type in 40 fathoms off Beachport, with 5 others quite fresh, all immature.

In some the bands below the periphery, instead of forming the spiral of hair lines, will coalesce, two to form one basal flame.

Its affinity seems to be with *P. menkeana*, Reeve, but its whorls are more convex, and it has not a similar body-whorl; but then it is immature.

Type in my collection.

*Lamitacella*  
*Pyrene lincolnensis*, Reeve. 598

*Columbella lincolnensis*, Reeve, Conch. Icon., 1859, pl. xxix., figs. 184a and b. *Type locality*—Port Lincoln, Australia. *C. (Mitrella)*, Angas, Proc. Zool. Soc., London, 1865, p. 166, No. 64; also, *op. cit.*, 1867, p. 195, Port Jackson; Tryon, Man. Conch., 1883, vol. v., p. 120, pl. xlvi., fig. 65; (*Atilia*) Kobelt, Conch. Cab. (Ed. Küster), Band iii., 1897, Abt. i.D, p. 131, No. 118, pl. xix., figs. 15 and 16; (*Columbella*) Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899, vol. xi. (N.S.), part 2, p. 199, Victorian coast; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 365, Tasmania; Hedley, Memoirs Aust. Mus., 1903, vol. iv., part 6, p. 377, 22 to 59 fathoms off the coast of New South Wales.

Taken all along the South Australian shore. Dredged alive in 5 fathoms off Edinburgh, many; in 7 fathoms, 1; in Backstairs Passage 17 fathoms, 3; in 24 fathoms off Newland Head, 1; dead, many at all depths to 22 fathoms; in 55 fathoms off Cape Borda, 1. This seems to be a shallow-water shell.

Its ornament varies greatly. One variety is quite white, with a narrow black spiral line just above the suture and circling the body-whorl.

131  
*Pseudamyela* 610  
*Pyrene lineolata*, Tryon.

*Columbella (Mitrella) lineolata* (Pease), Brazier, Tryon, Man. Conch., 1883, vol. v., p. 138, pl. li, fig. 53. *Type locality*—New South Wales. Kobelt, Conch. Cab. (Ed. Küster), 1897, Band iii., Abt. i.R, p. 214, pl. xxix., fig. 12.

~~P.~~ *Columbella dermestoides* Kiener, Angas (*non* Kiener), Proc. Zool. Soc., London, 1865, p. 167, No. 65, Port Lincoln; also *op. cit.*, 1867, p. 195, 5 fathoms Port Jackson.

*Columbella maculosa*, Pease, (*non* Sowerby), American Jour. Conch., 1871, vol. viii., p. 22.

*Columbella lineolata*, Pease, Brazier, Proc. Linn. Soc., New South Wales, 1877, vol. i., p. 231 (*non* *lineata*, Pease).

*Columbella lineolata*, Tyron, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 199, Victorian coast.

*Columbella lineolata*, Brazier, Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 366, Tasmania.

Taken on beach at Port Elliot and Port Lincoln, rare.

*Pseudamyela*  
*Pyrene milostoma*, Tenison-Woods. 611

*Columbella milostoma*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 134. *Type locality*—North coast, Tasmania: referred to *C. semiconvexa*, Lamarck, as a small form by Tryon, Man. Conch., 1883, vol. v., p. 125, pl. xlvi., fig. 93, and by Kobelt, Conch. Cab. (Ed. Küster), Band iii., 1897, Abt. i.D, pp. 81, 82; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 200, “Flinders, San Remo.”

*Columbella (Mitrella) unisulcata*, Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., p. 119, No. 100, pl. xvii., figs. 15 and 16. *Type locality*—Tasmania.

Misidentified as *Columbella saccharata*, Reeve, by Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 366.

Taken in Streaky and Fowler Bay (Tate), and on St. Francis Island. Dredged in 15 fathoms Investigator Strait, 1 perfect; in 110 fathoms off Beachport, 1 dead, immature. It is rare in South Australia.

*Zonitrella pulla*  
*Pyrene tenuis*, Gaskoin. 601

*Columbella tenuis*, Gaskoin, Proc. Zool. Soc., London, 1852 (1851), p. 2, Hab. (?); Reeve, Conch. Icon., 1859, pl. xxxv., fig. 224; Tryon, Man. Conch., 1883, vol. v., p. 227, pl. xliv., fig. 3; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., Abt. i.D and e, p. 127, No. 109, pl. xviii., figs. 15 and 16; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 201, Victorian coast.

~~Z.~~ *Columbella pulla*, Gaskoin, Proc. Zool. Soc., London, 1852 (1851), p. 6. *Type locality*—Unknown. Reeve, Conch. Icon., 1858, vol. xi., pl. xix., fig. 106; (*Mitrella*), Angas, Proc. Zool.

Soc., London, 1867, p. 195, Port Jackson; Tryon, Man. Conch., 1883, vol. v., p. 127, pl. xl ix., figs. 4 to 6; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., Abt. i.p., p. 106, No. 84, pl. xv., figs. 15 to 18; Adecock, Handlist Moll., South Australia, 1893, p. 5, No. 111.

*Columbella nux*, Reeve, Conch. Icon., 1859, vol. xi., pl. xxxv., fig. 227. *Type locality*—"Port Adelaide, New Holland."

*Columbella badia*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 151. *Type locality*—"Swansea, East coast."

*Columbella roblini*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 151. *Type locality*—"Storm Bay, East coast."

The colour variations are very many:—

- A. Uniform dark-brown, only columella white.
- B. An additional brown infrasutural line.
- C. A brown infrasutural and a white peripheral line.
- D. Dark-brown, spotted obscurely with white, the white columella sparsely blotched with brown.

E. Like D, but with a white-and-black articulated infrasutural line, and a peripheral spiral of white spots, varying in size and distinctness. The apex may be purplish, and the general colour purplish-brown.

F. Like D, but with axial dark-brown flames, zig-zag at the periphery.

G. Like A, but with dark-brown squarish flames or blotches, extending from suture to suture, or to a little below the periphery.

H. With a white or more or less deep-brown ground colour there may be axial brown stripes straight, wavy, or becoming broken up.

#### *Pyrene tenebrica*, Reeve.

*Columbella tenebrica*, Reeve, Conch. Icon., 1859, vol. xi., pl. xxxi., fig. 204. *Type locality*—Unknown. (*Mitrella*), Tryon, Man. Conch., 1883, vol. v., p. 128, pl. xl ix., fig. 9; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., Abt. i.p., p. 119, No. 99, pl. xvii., fig. 14; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 202, "Western Port"; Pace, Proc. Mal. Soc., London, 1902, vol. v., p. 143. [Cuming Coll., Brit. Mus., London (!).]

Taken on the beach at Port Elliot and dredged alive in 17 fathoms Backstairs Passage: identification confirmed by Mr. Gatliff.

I think this is only the variety D of *P. tenuis*, Gaskoin.

#### *Pyrene infumata*, Crosse.

*Columbella infumata*, Crosse, Jour. de Conch., 1863, p. 84, pl. i., fig. 3. *Type locality*—Gulf St. Vincent. Angas, Proc. Zool. Soc., London, 1865, p. 166, "Under stones and amongst weed, Salt Creek, Yorke Peninsula"; Tryon, Man. Conch., 1883, vol. v.,

p. 117, pl. xlvi., fig. 45; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892); Band iii., Abt. i.p., p. 105, No. 83, pl. xv., fig. 14; Adecock, Handlist Moll., South Australia, 1893, p. 5, No. 104.

Dredged in 7 fathoms, 1 alive; taken on Port Victor beach, typical; dredged in 9 fathoms, Port Lincoln, 1; and in Spencer Gulf, depth unrecorded, 3; taken on beach at Port MacDonnell, with an added peripheral narrow spiral line of white, dotted or continuous.

I think this is most likely only a variety of *P. tenuis*, Gaskoin.

*Lemirella*

*Pyrene-nubeculata*, Reeve.

604

*Columbella nubeculata*, Reeve, Conch. Icon., 1859, vol. xi., pl. xxxvii., fig. 234. *Type locality*—Unknown. (*Mitrella*), Tryon Man. Conch., 1883, vol. v., p. 140, pl. li., fig. 55; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., Abt. i., p. 113, No. 92, pl. xvi., fig. 18; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 202, Victorian coast; (*nubeculata*), Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 366, Tasmania.

*Columbella dictua*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1879 (1878), pp. 34 and 35. *Type locality*—North Tasmania. (*Mitrella*), Tryon, Man. Conch., 1883, vol. v., p. 126, pl. xlvi., fig. 96, very poor; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1895), Band iii., Abt. i., p. 209, No. 230, pl. xxix., fig. 1.

*Columbella (Mitrella) vincita*, Tate, Trans. Roy. Soc., South Australia, 1893, vol. xvii., p. 190, pl. i., fig. 11. *Type locality*—“Fowler and Streaky Bays, Middleton, and Cape Northumberland, South Australia; also North coast of Tasmania.”

Pritchard and Gatliff make *C. dictua* and *C. vincita* synonyms of *C. nubeculata*, though the locality of this species is unknown. Tate and May followed them, and for the sake of uniformity I have accepted the identity. I am, however, more disposed to think that *C. saccharata*, Reeve, might have priority; in publication it has priority in place in Conch. Icon., its locality (Van Diemen Land) is suggestive, its size 13 mm., though larger than the majority of examples, is equalled by some *C. vincita*, and it corresponds in description with the translucent pink or salmon-red varieties to which Pritchard and Gatliff refer.

There are three typical colour varieties, if we exclude *C. saccharata*, Reeve, *viz.*:—the *C. dictua* form, the *Vincta* form, and a maculated form.

The *Dictua* form, with its oblique wider or narrower brown lines coalescing into long arrow-heads, may vary as follows:—

1. There may be a peripheral spiral of white spots.
2. A peripheral spiral of articulated white-and-brown spots, and another infrasutural.
3. An infrasutural spiral only of articulated white-and-brown spots.

4. A peripheral spiral of white spots, the oblique lines above this thickened at intervals to form ragged brown axial flames.

5. Purple tinted.

6. A broad amber band over the lower three-fifths of the spire-whorl; a white band below this, from the level of the suture on the body-whorl; below this a somewhat fainter one on the base; the amber bands formed of very crowded oblique spiral lines.

They have been dredged in 17 to 22 fathoms in Back-stairs Passage, 16 alive or in good condition; in Gulf St. Vincent and Spencer Gulf at unrecorded depths, 5 dead; and taken on the beach along the South Australian coast and on St. Francis Island. Comparatively rare.

The *Vincta* form may vary as follows:—

1. The dark band on the spire-whorls may reach the anterior suture.

2. There may be a white band between it and the suture.

3. The band may be scalloped, behind only, or in front also; the posterior white bands may be interrupted by the points of the scallops reaching the suture.

4. A second revolving broad band, generally lighter in colour, usually occurs on the front of the body-whorl, and may be quite separated from the first by a white band, or united at intervals by the points of the scallops.

5. There may be numerous axial hair lines from the band, back to the suture, and forward to the base.

6. There may be a single dark-brown band at the posterior suture, fading out anteriorly, and there may be in addition a double narrow line at the periphery. Middleton (Miss Stow).

The maculated form:—

This is the shell which was recorded in Adcock's Handlist of Aquatic Moll. of South Australia, 1893, p. 5, No. 117, as *C. Tayloriana*, Reeve, *albomaculata*, Angas; but it was a mis-identification, and is a variety nearly allied to *C. vincta*, Tate.

1. It has a row of dark-brown blotches on the spire-whorls, a second row just in front of the periphery on the body-whorl, and a narrow infrasutural row of white spots. Gulf St. Vincent, (?) depth, 1 dead; Edinburgh rocks, many alive.

2. The second row of blotches may be absent. Gulf St. Vincent, (?) depth, 1 alive, 7 dead; Edinburgh rocks, alive; Venus Bay, 1; Beachport beach, 1.

3. There may be a white-and-brown peripheral spiral, and the blotches may be broken up into short spiral splashes,

or replaced by flames extending axially in a zigzag way which may be composed of narrow lines, and so approach *C. dictua*. The blotches may tend to coalesce spirally, and so approximate *C. vineta*, Tate.

This form was sent to me some time ago from North Tasmania under the name of *C. achatina*, Sowerby, the type locality of which is Swan River. (*Columbella achatina, nobis*, Sowerby, Thes. Conch., vol. i., 1847, p. 132, sp. 61, pl. xxxix., fig. 126.) The figure is 18·5 mm., and appears to be drawn of the natural size. An exactly similar shell I have from Rottnest Island, off Swan River. Reeve's figure, No. 54, pl. xii., Conch. Icon., is, however, 23·5 mm. long, and no measurement is given; so if drawn of natural size this can scarcely be identical.

*Pseudamycla miltostoma* ??  
*Pyrene saccharata*, Reeve.

*Columbella saccharata*, Reeve, Conch. Icon., 1859, pl. xxix., fig. 187. Type locality—Van Diemen's Land; Pace, Proc. Mal. Soc., London, 1892, vol. v., pp. 131 and 132.

Tryon, Man. Conch., 1883, vol. v., p. 125, makes it a synonym of *C. semiconvexa*, Lamarck, and is followed by Kobelt, Conch. Cab. (Ed. Küster), 1897 (1892), Band iii., Abt. i.b, pp. 81 and 82, No. 60.

Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 366, make it the specific name of ~~C.~~ *miltostoma*, Tenison-Woods, and *C. unisulcata*; Kobelt, giving Dr. Milligan's shells from Oyster Bay as the British Museum types; but Pace says these are not the types, but the Cuming Collection shells. Tate and May give a figure, *op. cit.*, pl. xxiv., fig. 19, of *C. miltostoma* as their *C. saccharata*. The description of *C. saccharata* does not apply, this has sulcations only over the base; in *C. miltostoma* they are as shown in Tate and May's figure all over the body-whorl, and especially just below the suture.

This shell is translucent and unicoloured, and may be typically pinkish: but it may be amber coloured, yellowish, or white.

It has been taken on the beach at MacDonnell Bay; in 12 fathoms off Porpoise Head, 2; in 16 fathoms off Tunk Head, 1 alive; in 17 fathoms Backstairs Passage, 9; in 20 fathoms off Newland Head, 1 alive; in Gulf St. Vincent up to 22 fathoms, 60 alive and dead; in 40 fathoms off Beachport, 1 good, dead.

The following variations may be met with in shells with the same translucence, sculpture, and shape, and link it to

*Pyrene nubeculata*, Reeve, of which I think it is only a variety:—

1. A whitish shell with an opaque white continuous band encircling the body-whorl from the suture.
2. Or with a spiral of white dots encircling it.
3. A white-dotted peripheral spiral, and an infrasutural spiral of narrow elongate brown spots; sometimes the brown spots are faint or invisible, and there are opaque white spots; sometimes white-and-brown spots articulate; sometimes the space between these spirals is dotted white.
4. A white-dotted peripheral spiral, and above this a spiral of larger fewer brown blotches.
5. A white-dotted peripheral spiral, above this a spiral of brown spots, and another at the suture clouding into each other between.
6. A white-spotted peripheral spiral with about twelve wavy axial brown thin flames from suture to snout.
7. A distinct dark-brown hair line at the periphery, and showing immediately above the suture, or with this hair line immediately above a white-dotted peripheral spiral, or with broad light-brown distant axial flames to the suture above, or with the peripheral hair line, and above this fine oblique *Dictua* lines up to the suture.
8. A peripheral spiral only of narrow elongate spots, appearing just above the suture in the spire.

*Macrogryphaea* *Pyrene legrandi*, Tenison-Woods. 620

*Columbella legrandi*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 152. *Type locality*—"King's Island, Tasmania." Tryon, Man. Conch., 1883, vol. v., p. 137, pl. li., fig. 49; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1895), p. 212, No. 237, pl. xxix., fig. 9; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 367; May, Proc. Roy. Soc., Tasmania, 1902, p. 110, fig. 5, in text; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (N.S.), part 1, p. 373, Victorian coast (recorded *op. cit.*, 1899, vol. xi., p. 203, as *C. brunnea*, Brazier).

The colouration is very variable. The shell may be uniformly rose-pink, brown, or white. There may be a dotted white sutural line, and a peripheral white spiral, continuous or interrupted. There may be white and amber-coloured axial flames from the suture to a white peripheral spiral band, or crowded opaque white axial narrow lines, or narrow obliquely spiral *Dictua*-like lines, either brown or opaque-white, or in an opaque white shell there may be a spiral of distant fantastic amber blotches in the spire-whorls, an amber continuous spiral above the suture, and a broad basal amber band.

Dredged in 12 fathoms Backstairs Passage, 1 fresh, 1 dead; in 17 fathoms, 3 alive, 10 dead; in 20 fathoms, 4 fresh; in 22 fathoms, 3 alive, 26 dead; in 35 fathoms off St. Francis Island, 4 immature; in 40 fathoms off Beachport, 6 dead; in 90 fathoms off Cape Jaffa, 3 dead; in 110 fathoms off Beachport, 1 very poor; in 150 fathoms, 2 dead, perfect; in 200 fathoms, 1 very poor. This seems to be a fairly deep-water form for the genus.

*Zella beddomei* 609  
*Pyrene attenuata*, Angas.

*Columbella attenuata*, Angas, Proc. Zool. Soc., London, 1871, p. 14, plate 1, fig. 4. *Type locality*—"Port Jackson (Brazier)" (*Atilia*), Tryon, Man. Conch., 1883, vol. v., p. 151, pl. liii., fig. 18; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1896), Band iii., Abt. i., p. 220, No. 251, pl. xxx., fig. 6; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 203, Victorian coast; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 365, "Pirate's Bay, Tasmania (May)"; Hedley, Memoirs Austr. Mus., 1903, vol. iv., part 6, p. 377, 24 to 27 fathoms and 63 to 75 fathoms off coast of New South Wales.

*Zella beddomei*, Petterd, Jour. of Conch., 1884, vol. iv., p. 142, No. 28. *Type locality*—"Brown's River, Tasmania."

Dredged in 24 fathoms off Newland Head, 1 poor; in 40 fathoms off Beachport, 2 poor; in 110 fathoms, 15 good and 68 poor; in 150 fathoms, 37 dead; in 200 fathoms, 8 poor; in 130 fathoms off Cape Jaffa, 10 moderate, 60 poor.

This species does not appear to inhabit our shallow waters, but to be fairly common in from 100 to 150 fathoms.

*Macrocypraea falquida* 619  
*Pyrene angasi*, Brazier.

*Columbella interrupta*, Angas (non Gaskoin), Proc. Zool. Soc., London, 1865, p. 56, pl. ii., figs. 9 and 10. *Type locality*—Yorke Peninsula, South Australia.

*Columbella Angasi*, Brazier, op. cit., 1871, p. 322; (*Mitrella*), Tryon, Man. Conch., 1883, vol. v., p. 128, pl. xlix., fig. 11; Adcock's Handlist Aquatic Moll., South Australia, 1893, p. 5, No. 113; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1895), Band iii., Abt. i., p. 210, No. 233, pl. xxix., fig. 4; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 201, Victorian coast; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 365, Tasmania; Hedley, Memoirs Austr. Mus., 1903, vol. iv., part 6, p. 378, 54 to 59 fathoms off Wata Mooli, New South Wales.

*Columbella minuta*. Tenison-Woods (non Gould), Proc. Roy. Soc., Tasmania, 1876 (1875), p. 152. *Type locality*—Swansea, East coast of Tasmania.

*Columbella-(Mitrella) tenisoni*, Tryon, Man. Conch., 1883, vol. v., p. 128, pl. xlix., fig. 10, nom. mut. Kobelt, Conch. Cab. (Ed. Küster), 1897 (1895), Band iii., Abt. i., p. 210, No. 232; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 201, Victorian coast.

This is a most variable little species, both in shape and ornament. From single specimens several species might be created, but examination of a large number of individuals combines them all into one.

The shell may be comparatively long in the spire and narrow, or very short and broad; the whorls may be sloping and flat, or quite convex, and sometimes tumid beneath the suture, and the outer lip may be straight, or curved, or medially compressed. I have sought to separate a form which might be distinguished as *C. tenisoni*, Tryon, but without success, and have to coincide with Crosse that this species (*nom. mut.* for *C. minuta*, Tenison-Woods) is a synonym of *C. angasi*, Brazier. The colour markings have been studied very elaborately, and are described somewhat exhaustively below. I may say that the varying shapes may be found in the different groups of colour ornament, hence the impossibility of distinguishing two or more species.

The species show the following colour variations:—

A. It has a white band round the middle of the body-whorl, appearing partly above the sutures in the spire, with bold white S-shaped marks, and a spotted white spiral over the back of the canal, with brown crescents convex forwards a little below the suture, and brown axial hair lines to the base, interrupted by the peripheral white band.

B. There may be in addition a row of brown crescents convex forwards above and below the peripheral white band between the ends of the S-shaped marks.

C. There may be infrasutural brown crescents and axial brown hair lines to the base, uninterrupted by any peripheral white band.

D. There may be an articulated opaque white spiral just above the periphery, and another narrower a little below it; the space between them being translucent white, and axial brown hair lines from this to the suture above and the base below.

E. From the back of the aperture the base of the body-whorl is blackish-brown, abruptly lined above by the peripheral white spiral, and traversed below by a white spiral line just above the engraved spirals over the canal.

F. Shell white or brown or light-brown, with dark purple tips, simply pencilled axially with brown hair lines.

A second series is found with quite a distinct type of colouration, the hair lines being absent.

A. With axial brown or golden-brown narrow boomerang-shaped flames convex forwards from the suture to the periphery, and another from this over the base.

B. The flames may be wavy, with several curves in their total length.

C. With the axial flames there may be a white spiral band beneath the suture, a peripheral spiral of white spots, and a white spiral just above the revolving liræ over the canal.

D. The flames may be absent and only the three white spirals may remain.

E. Or the lower two only.

F. Or only that above the notch.

G. Or the shell may be wholly white and unornamented.

A third series consists of shells of a cinnamon-brown tint, or bluish or purplish-white. It is squat in shape, with convex-whorls slightly tumid below the suture, with a blackish-purple apex.

A. The body-whorl is ornamented throughout with three spiral rows of arrow-heads directed forwards, and formed of dark-brown rather close-set lines; the three rows are separated along two narrow spiral lines, one just above the periphery and the other from the back part of the aperture.

B. The arrow-head markings may be absent, the shell being otherwise indistinguishable.

A fourth series has two broad pale-pink spirals on the body-whorl; sometimes the upper one is broken up into large square blotches. The upper band is defined below by a narrow spiral line of white spots; these may be narrow, transversely elongate, placed obliquely, with the anterior end slightly higher than the posterior, or club-shaped, with the wider end in front; sometimes from the narrow end of these clubs directed downwards and backwards, a narrow long white spot may extend downwards and forwards.

Taken on the beach all along the coast from Beachport to St. Francis Island. Dredged in Gulf St. Vincent and Spencer Gulf, many alive and dead; in 40 fathoms off Beachport, 36, some alive; 45 fathoms off Neptune Island, 1 poor; 55 fathoms off Cape Borda, 25 good, 2 poor; 90 fathoms off Cape Jaffa, 1; 110 fathoms off Beachport, 2 good, 37 poor; 130 fathoms off Cape Jaffa, 15 very poor; 150 fathoms off Beachport, 1 poor. This species extends out into quite deep water.

### *Obacrospira*

*Pyrene beachportensis*, n. sp. Pl xxix., figs. 8 and 9. **615**

Shell small, solid, of five whorls, including a blunt protoconch of two round smooth whorls ending abruptly. Suture linear, distinct, ascending at the aperture. Spire-whorls convex below the suture; the first two sloping towards the lower suture, the third somewhat contracted. Body-whorl large

convex, roundly contracted at the base, with a moderately long pillar.

Aperture obliquely axially rhomboidal, with a distinct gutter below the suture, outer lip swollen below the suture corresponding with the gutter, then straight or slightly impressed, anteriorly curved with a shallow infrasutural sinus in its border. Inner lip distinct, complete. Columella straight in upper half, and bent to the left in its lower. Canal open and notched.

Sculpture, slightly rude axial growth lines; eleven spirals from the labium winding round the snout.

Ornament, amber coloured, with spiral of large opaque white spots below the suture; and beneath this a narrow continuous white band, a second spiral of larger spots starting from the back of the aperture. The area between the continuous band and the front of this spiral row of spots being translucent white. A dark spot on the apex.

*Dim.*—Length, 4 mm.; of body-whorl, 2·2 mm.; breadth, 1·8 mm.

*Locality.*—Type, 40 fathoms off Beachport, with 1 other; 110 fathoms off Beachport, 2; 150 fathoms off Beachport, 1.

*Diagnosis.*—It differs from *P. atkinsoni*, Tenison-Woods, in its blunt apex; and from *P. angasi*, of Brazier, and *P. tenisoni*, Tryon, in its swollen whorls and its large peripheral row of white spots, and especially in the bend of the canal.

Type in my collection.

### *Macrogyra* *Dyrene atkinsoni*, Tenison-Woods. 614

*Mangelia atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 141. *Type locality*—"East coast of Tasmania."

*Columbella (Anachis) speciosa*, Angas, Proc. Zool. Soc., London, 1877, p. 35, pl. v., fig. 3. *Type locality*—"Port Jackson." (*Seminella*), Tryon, Man. Conch., 1883, vol. v., p. 171, pl. Ivii., fig. 24; Kobelt, Conch. Cab. (Ed. Küster), 1897 (1896), Band iii., Abt. i., p. 237, No. 281, pl. xxii., fig. 7; Adcock, Handlist Aquatic Moll., South Australia, 1893, p. 5, No. 119.

*Columbella atkinsoni*, Tenison-Woods, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 204, Victorian coast; Tate and May, Proc. Linn. Soc., New South Wales, 1901, vol. xxvi., part 3, p. 366.

Some examples are long and narrow, while others are short and ventricose; there may be quite valid axial ribs, or none, especially in longer individuals.

There may be a spiral row of white spots immediately below the suture. In some this may be present in the upper whorls, while the later whorls show a continuous opaque white

infrasutural spiral, with white prolongations from it on the upper ends of the axial ribs, or even all along them. A second spiral row of white spots may occur just above the suture through all the spire-whorls and above the periphery of the body-whorl, or it may disappear from the later spire-whorls and be found below the periphery of the body-whorl. The spots may be round, crescentic, or arrow-headed, directed forward. A third spiral of opaque white spots may be present just above the canal, which may also be white. There are axial wavy fine brown hair lines from the infrasutural white spiral to the canal, interrupted by the central and basal white spirals. Sometimes in addition the shell has a well-marked brown colour, and all the margin of the aperture may have a shining dark-brown tint; one variant has a golden-brown spiral band a little below the infrasutural white spiral as its only ornament.

It is taken on the beach at Murat Bay and St. Francis Island in the west. It is dredged alive in 5 fathoms Gulf St. Vincent, many; 6 fathoms off St. Francis Island, several; 15 to 20 fathoms Investigator Strait, 4; 35 fathoms off St. Francis Island, several; dead in 40 fathoms off Beachport, 10 moderate, immature; 55 fathoms off Cape Borda, 62 good, short form, 7 very poor, long form; 62 fathoms off Cape Borda, 4 very poor.

*Macrogastra*  
*Pyrene dolicha*, n. sp. Pl. xxix., fig. 1. 617

Shell subulate of eight whorls, including a rather pointed protoconch of two smooth scarcely convex turns. Spire-whorls scarcely convex; suture distinct, subcanalicate; body-whorl long, cylindrical, base roundly contracted; aperture narrowly oblong-oval, angulate behind, widely open in front, notched; outer lip straight, minutely swollen at the suture, scarcely impressed at its centre, effuse anteriorly; inner lip distinct, thick, erect, thickened at the suture, where it roundly joins the outer lip. Smooth, except for seven spiral liræ winding from the inner lip round the snout. Ornament, an infrasutural row of axial opaque-white spots in the upper whorls, and a brown tinting of the margin of the aperture,

*Dim.*—Length, 4·8 mm.; breadth, 1·4 mm.

*Locality.*—Gulf St. Vincent.

The type is unique; its apex and general facies and ornament are those of the smooth variety of *P. atkinsoni*, Tenison-Woods, but it is very much larger. It may be only an extreme variant.

Type in my collection.

# *Macrozapha*

142

## *Pyrene remoensis*, Gatliff and Gabriel. 621

*Columbella remoensis*, Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1910, vol. xxiii. (N.S.), part 1, p. 82, pl. xviii., figs. 1 and 2. *Type locality*—San Remo, Western Port.

Dredged in Gulf St. Vincent, depth not recorded, 6 good, 38 dead; in 40 fathoms off Beachport, 6 moderate; in 55 fathoms off Cape Borda, 5 good, 5 poor; in 62 fathoms, 1 poor; in 110 fathoms off Beachport, 1 good, 5 poor; in 130 fathoms off Cape Jaffa, 2 poor; in 150 fathoms off Beachport, 1 poor.

To the author's description I may add that there is also an infrasutural row of tiny tubercles, due to the splitting of the row of large tubercles each into two. The ornament in the living shell consists of two translucent spiral bands, one on the spire-whorls between the large tubercles and the suprasutural, and winding round the body-whorl to the centre of the outer lip, it is edged above with a broken brown hair line, and towards the lip becomes brown; the other winds round the base and over the snout, where it is mottled and streaked with brown.

# *Macrozapha*

## *Pyrene fenestrata*, n. sp. Pl. xxix., fig. 7. 618

Shell minute, of five whorls, including a blunt protoconch of one convex-whorl and a half, ending abruptly by a scar. Spire-whorls shouldered in the upper third; above this sloping, below this vertical. Body-whorl voluminous, shouldered, subangulate at the periphery, concavely contracted at the base. Aperture rhomboidal, contracted posteriorly; canal wide, deflected to the left; outer lip simple, thin; columella straight, feebly bidentate. Sculpture, short plicate tubercles from the suture to just beyond the shoulder, sixteen in the body-whorl; closely feebly spirally striate all over. There is a spiral row of translucent crescentic areas convex forward, just above the sutures, like windows, as though formed by grinding away the opaque outer layer of the shell, eight in the body-whorl, with the spiral striae showing like scratches in the glass. There is a second series of them just below the periphery, becoming a broad translucent band towards the lip margin. Colour opaque-white, with a small obscure pale-brown blotch in the lower half of the lower series of windows.

*Dim.*—Length, 3·4 mm.; of the body-whorl, 2·4 mm.; breadth, 1·65 mm.

*Locality*.—Type, Venus Bay beach, 2; St. Francis Island beach, 1.

Type in my collection.

*Pyrene jaffensis*, n. sp. Pl. xxix., figs. 5 and 6. 608

Shell cylindrically fusiform. Protoconch blunt, of one whorl and a half, subconvex, smooth, ending abruptly by a scar. Whorls four, subconvex. Sutures distinct, subcanaliculate, very narrowly marginate, ascending near the aperture. Body-whorl oval, somewhat compressed at the base. Aperture oval, narrowed posteriorly; canal wide, notched; outer lip thin, simple, infrasuturally feebly excavate; columella curved, obtuse-angled at the sinistrally directed canal. Smooth, but for sublenticular minute axial and longitudinal crowded scratches.

Dim.—Length, 5·9 mm.; of body-whorl, 3·4 mm.; breadth, 2·2 mm.

Locality.—Type from 130 fathoms off Cape Jaffa, dead, with 2 others; 40 fathoms off Beachport, 1 good; 110 fathoms, 4 poor; 55 fathoms off Cape Borda, 1 moderate; 62 fathoms, 2 poor; Gulf St. Vincent, depth unrecorded, 1 alive, of a light-brown colour, protoconch darker.

Its generic location is questionable, but must be determined by future examination of the mollusc.

Type in my collection.

*Antizyfra* *Pyrene plexa*, Hedley. 622

*Columbella plexa*, Hedley, Proc. Linn. Soc., New South Wales, 1901, part 4, p. 702, fig. 25; (*Pyrene*), Verco, Trans. Roy. Soc., South Australia, 1908, vol. xxxii., p. 343.

It has been taken by me also in 90 fathoms off Cape Jaffa, 2 good; in 110 fathoms off Beachport, 3 good; and in 130 fathoms off Cape Jaffa, 8 good, 7 poor.

*Macrozyfra* *Pyrene calva*, n. sp. Pl. xxix., figs. 2 and 3. 613

Shell solid, of six whorls, including a protoconch of two convex smooth whorls, ending abruptly. Spire-whorls convex, sutures impressed. Body-whorl, base roundly contracted; aperture narrowly oblong-oval, pinched anteriorly into a notched canal with slightly reflected margin. Outer lip with three denticles inside its posterior third, the largest behind, and a small round shallow infrasutural sinus; inner lip a thin glaze. Sculpture bold, two spirals in the first spire-whorl, three in subsequent whorls, twelve in the body-whorl; their intersection with the axials, of which there are sixteen to eighteen in the penultimate, are tuberculate, except in the anterior four spirals on the snout, which are crossed only by oblique striæ.

Dim.—Length, 4·4 mm.; breadth, 1·7 mm.

Locality.—Type dredged in 55 fathoms north-west of Cape Borda, with 57 others, in good condition; in 6 fathoms

off St. Francis Island, 1 poor; in 10 to 15 fathoms, 1 poor; in 17 fathoms Backstairs Passage, 4 dead; in 22 fathoms, 6 fresh; in Gulf St. Vincent, below 25 fathoms, 37 dead and fresh; in 40 fathoms off Beachport, 6 good; in 45 fathoms east of Neptunes, 1 poor; in 55 fathoms off Cape Borda, 58 good; in 62 fathoms, 4 moderate; in 90 fathoms off Cape Jaffa, 13 moderate; in 104 fathoms, 35 miles south-west of Neptunes, 13 moderate; in 110 fathoms off Beachport, 1 fresh, 4 moderate; in 130 fathoms off Cape Jaffa, 1 good, 4 moderate; in 200 fathoms off Beachport, 1 very poor.

*Diagnosis*.—It approaches *P. gemmulifera*, Hedley, Proc. Linn. Soc., New South Wales, 1907, vol. xxxii., part 3, p. 510, pl. xix., fig. 44, but has a smooth protoconch; any axial sculpture on it, which is very rare, is only a faint striation near the upper suture, and close to the abrupt ending of the protoconch, quite different from the ribbing of Hedley's species. The spire-whorls are well rounded, and contain mostly three spirals. It is a larger species. Gatliff and Gabriel have recorded this shell for Victoria in Proc. Roy. Soc., Victoria, 1910, vol. xxiii. (N.S.), part 1, p. 89, as *Columbella gemmulifera*, Hedley, noting the differences as varietal, which I regard as specific.

*Variations*.—When alive the shell is translucent shining uniform light-amber colour, the protoconch rather darker, or a broad whitish band may encircle the middle of the whorls, fading out before reaching the aperture: the protoconch may be purple; generally the shell is translucent or opaque-white, probably from bleaching. *Sculpture*.—The axials and spirals may be well marked, but the tuberculation obsolete, giving a latticed pattern. There may be two spirals in the first spire-whorl; the back one may then split behind into a third, which gradually enlarges, and this may in the fourth whorl give off another one behind. There may rarely be three spirals in the first spire-whorl, and four in the second.

Type in my collection.

*Neurozaphra Pyrene cominellæformis*, Tate. 616  
*Columbella cominellæformis*, Tate, Trans. Roy. Soc., South Australia, 1892, vol. xv., p. 126, pl. 1., fig. 8. *Type locality*—Fowler Bay to Victoria. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1899 (1898), vol. xi. (N.S.), part 2, p. 204, "Western Port"; Pace, Proc. Mal. Soc., London, 1902, vol. v., p. 68.

Dredged on Yatala Shoal 6 to 10 fathoms, 1; in 15 fathoms off Middleton, 1 dead; in 22 fathoms Backstairs Passage, 1 alive, 1 dead.

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**Truncaria australis, Angas.**

*Truncaria australis*, Angas, Proc. Zool. Soc., London, 1877, p. 172, pl. xxvi., fig. 5. *Type locality*—Port Jackson. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1906, vol. xviii. (N.S.), part 2, p. 44, Victorian coast.

Dredged in 40 fathoms off Beachport, 2 good, 1 poor. One of these is of bluish-pink tint.

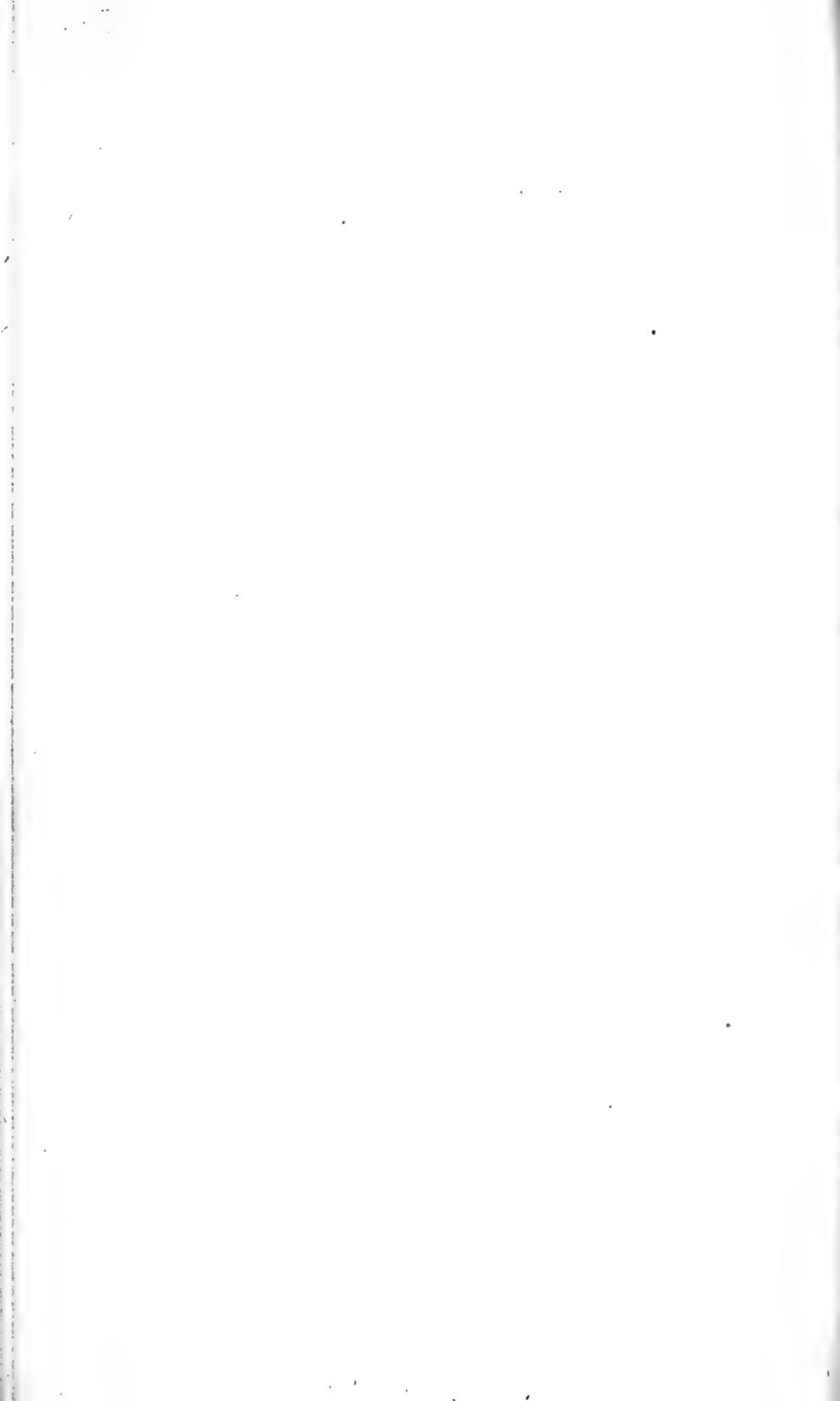
## EXPLANATION OF PLATES.

## PLATE XXIX.

1. *Pyrene dolicha*, Verco, n. sp.
2. " *calva*, Verco, n. sp.
3. " *axiaerata*, Verco, n. sp. protoconch.
4. " *jaffensis*, Verco, n. sp., side view.
5. " *ventralis*, Verco, n. sp.
6. " *fenestrata*, Verco, n. sp.
7. " *beachportensis*, Verco, n. sp., dorsal view.
8. " " mouth.

## PLATE XXX.

1. *Triphora novapostrema*, Verco, n. sp.
2. " *Turritella circumligata*, Verco, n. sp. protoconch.
3. " *mediolevis*, Verco, n. sp. protoconch.
4. " *neptunensis*, Verco, n. sp. protoconch.
5. " *medioangulata*, Verco, n. var. " protoconch.





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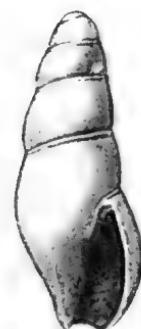
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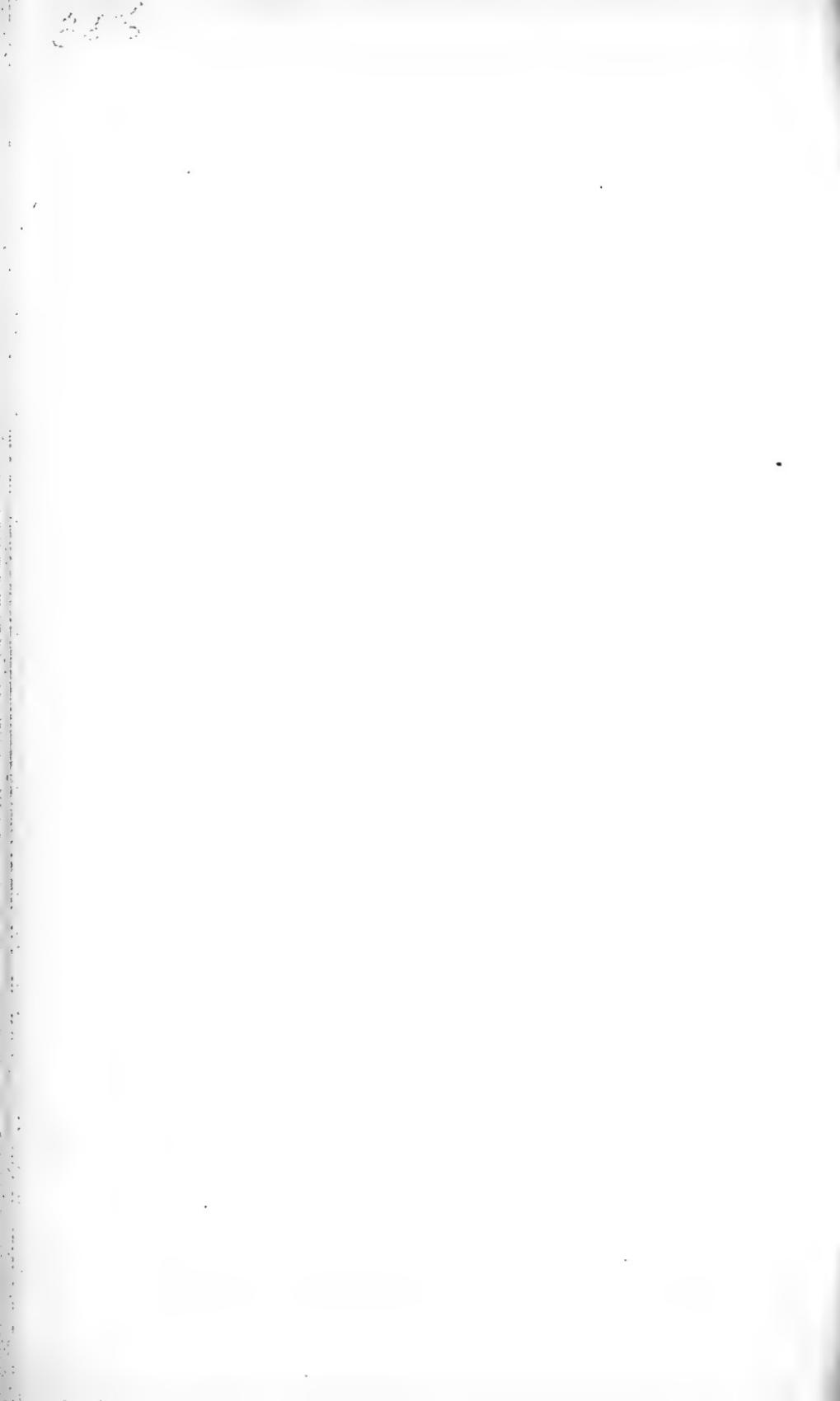
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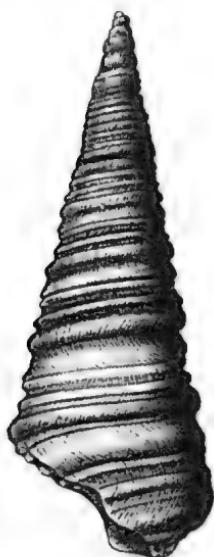




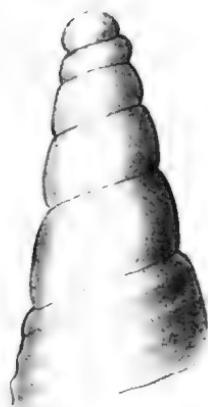
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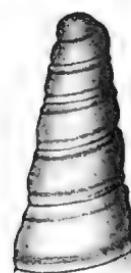
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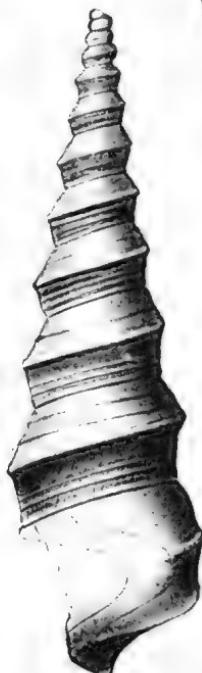
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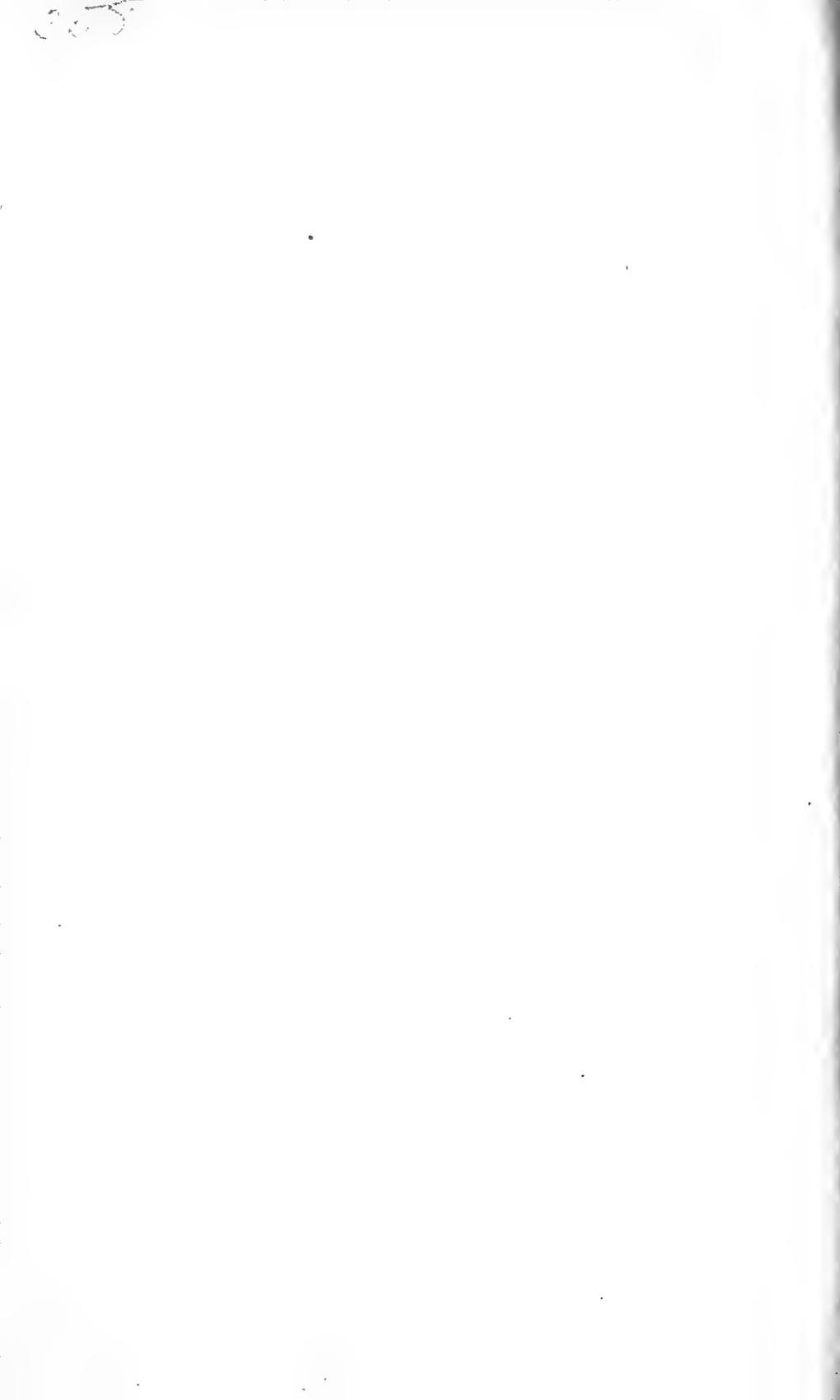


Fig. 6. *Amphoroidea elegans*, first maxilla.

- " 7. " " second maxilla.
- " 8. " " first gnathopod.
- " 9. " " second gnathopod.
- " 10. " " seventh leg.
- " 11. " " second pleopod of male.

PLATE XXIII.

Fig. 1. *Paracassidina pectinata*, n. gen. et sp., magnified 6 diameters.

- " 2. " " anterior region from above.
- " 3. " " antennule and epistome from below.
- " 4. " " maxilliped.
- " 5. " " first gnathopod.
- " 6. " " second gnathopod.
- " 7. " " first pleopod.
- " 8. " " second pleopod, male.
- " 9. " " fifth pleopod.
- " 10. " " uropod.

## WESTERN AUSTRALIAN POLYPLACOPHORA.

By W. G. TORR, M.A., B.C.L. (Oxon.), LL.D.  
(Dublin and Adelaide).

[Read October 12, 1911.]

## PLATES XXIV. AND XXV.

In the September, 1910, number of the Proceedings of the Malacological Society of London, vol. ix., part 3, p. 153, Mr. Tom Iredale has some "Notes on Polyplacophora, chiefly Australian." On p. 159, Mr. Iredale says: "I conclude that the chiton fauna of Western Australia will be of a most interesting nature."

Through the courtesy of Dr. J. C. Verco, the President of the Royal Society of South Australia, I was able during the Christmas vacation of 1910-11 to make a fairly thorough exploration of the south coast of Western Australia from Esperance to Albany, and the west coast as far north as Fremantle.

The places visited were Esperance, Hopetoun, Albany, Ellenbrook and Yallingup (south of Cape Naturaliste), Geographe Bay, Rottnest Island, and Fremantle Harbour. With the assistance of Mr. Hedley, conchologist (of the Australian Museum, Sydney), and Mr. Basset Hull, of Sydney, I have been able to identify twenty-three species of Western Australian polyplacophora similar to South Australian species and nine others, seven of which I take to be new.

As Mr. Iredale suggests in the paper mentioned, the list contains representatives of the Adelaidean region. At least fifteen of the identified species are found in his Adelaidean list, one is classified as Solanderian, two are in the Peronian, and three are in the "Doubtful Position" list. The seven new species will probably represent the Autochthonian element to which Mr. Iredale refers.

The small rise and fall of the tides (not more than 2 or 3 ft.) on the visited parts of the Western Australian coast make chiton hunting much more precarious than in South Australian waters. While a large number of South Australian chitons are found in Western Australia, yet there are some striking differences.

I have traced *Plaxiphora albida*, Blain, locally known as *P. petholata*, Sby., all round the South Australian coast from MacDonnell Bay to Murat Bay, a distance of nearly a

thousand miles of coastline, but going out from Murat Bay to St. Francis Island (Nuyts Archipelago), a distance of 40 miles, *Plaxiphora costata*, Blain, formerly known as *P. glauca*, Q. et G., takes the place of *P. albida*, and specimens of *P. costata* were found in Western Australian waters. *P. albida*, Blain., is generally found on or above high-water mark in South Australia, but on the Western Australian coast its place is taken by *Liophura georgiana*, Q. et G. These could be frequently seen on exposed rocks. The order of exposure in South Australian waters, *mutatis mutandis*, is *P. albida*, on exposed rocks at or near high-water mark; *I. crispus*, in abundance everywhere, in sheltered pools, a foot or two below, with *Acanthochites* on sandy moss-covered rocks. In deeper pools, *I. contractus*, *I. cariosus*, *I. ustulatus*, *I. smaraydinus*, and other *Ischnochitonidae*, and deeper still in 2 or 3 ft. of water at low tide, the true chitons, *jugosus*, *tricostalis*, *exoptandus*, and *calliozona*. On the west side of St. Vincent's Gulf I have found the true chitons on exposed rocks in shallow pools.

The order in which Western Australian chitons are found is *Liophura georgiana*, near or above high-water mark (*P. albida* and *I. crispus* are missing), and on account of the small fall of the tides *Chitons*, *Callochitons*, and *Ischnochitons* may be found together. The *Ischnochitonidae* favour shallow pools, while the true chitons prefer the ocean surf.

*Chiton torrianus* was found in Western Australia on the under-side of wholly exposed rocks. This chiton, formerly misnamed *coxi*, was separated by Hedley and Hull as *C. torri*, afterwards altered to *torrianus*. It was rarely found in South Australian waters till Mr. Walter Klem, of Corney Point, Yorke Peninsula, discovered a number. In Western Australia it was found in almost every place visited.

It is hoped that this first paper on Western Australian Polyplacophora may do something to stimulate and help future beginners at chiton-hunting in Western Australia.

My acknowledgments are due to Mr. W. T. Bednall, whose excellent paper on South Australian Polyplacophora, Proc. Mal. Soc., London, vol. ii., part iv., April, 1897, has been the foundation of much of my work, and to whose paper I have had frequently to refer; also to Mr. M. M. Maughan, B.A., for his kindly revision of my paper and his assistance in examining my new species and verifying some of my descriptions.

#### 1. CALLOCHITON PLATESSA, Gould, 1846.

F 551 S. AUS

*Chiton platessa*, Gould, Proc. Bost. Soc., N.H. II., 1846, p. 143; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 49.

Three specimens collected. It is common in New South Wales, rare in the Adelaidean and Western Australian regions. Specimens obtained at Rabbit Island (Albany), Ellenbrook, and Rottnest Island. Colour markings resemble New South Wales species. Dark-red with splashes of orange and olive-green. About 20 valves of a bright-pink colour, picked up at Ellenbrook, were evidently bleached specimens of *platessa*.

*Ischnochiton* **2. ISCHNOCHITON (STENOCHITON) JULOIDES**, Ad. and Ang., *F* 1864.

*Stenochiton juloides*, Ad. and Ang., Proc. Zool. Soc., 1864, p. 193; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 55.

Two anterior valves and one median valve of this very slippery chiton were collected in shell-sand at Albany.

*Ischnochiton cariosus*, Carpenter, 1873. *F*

*Heterozona cariosa*, Carpenter, MS.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 65.

Numbers of these were found at Rottnest Island, Albany, Hopetoun, Yallingup, and Ellenbrook (south of Cape Naturaliste). The Western Australian specimens are much less coated with serpularia, etc., than the South Australian species.

*Ischnochiton ustulatus*, Reeve, 1847. *F*

*Chiton ustulatus*, Reeve, Conch. Icon., sp. 102; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 96.

Several specimens were taken on the west coast at Rottnest Island and Yallingup. None were found on the south coast. This chiton travels easily. One collector reports finding them in abundance at one spot in South Australia, but they had all vanished a few days later.

*Ischnochiton crispus*, Reeve, 1847. *F*

*Chiton crispus*, Reeve, Conch. Icon., sp. 120; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

*Ischnochiton Haddoni*, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 88.

The specimens classified as *I. crispus* are either so small or in such bad condition that I have hesitated in allowing *crispus* to appear at all. They were found only in the places examined nearest to the South Australian border, Esperance and Hopetoun. It is interesting to find that a chiton so common in South Australia and Victoria should be so rare in Western Australia. The specimens found closely resemble our South Australian *I. variegatus*, which is probably only a variety of *I. crispus*.

*Ischnochiton*

6. ISCHNOCHITON CONTRACTUS, Reeve.

*Chiton contractus*, Reeve, Conch. Icon., sp. 78; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

*Chiton pallidus*, Reeve, Conch. Icon., sp. 92; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Fairly common in sheltered pools on the south coast. I have specimens from Hopetoun and Albany.

*Ischnochiton decussatus*

7. ISCHNOCHITON DECUSSATUS, Reeve, 1847.

*Chiton decussatus*, Reeve, Conch. Icon., sp. 107; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

*Chiton castus*, Reeve, Conch. Icon., sp. 145.

*Lepidopleurus speciosus*, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192.

Two specimens were taken from buoys between Fremantle and Rottnest Island. Through the courtesy of the harbour-master we were permitted to be present at the lifting and cleaning of the buoys. *I. decussatus* is frequently found attached to such shells as *Pinna inermis*, Tate.

8. ISCHNOCHITON PTYCHIUS, Pilsbry.

*Ischnochiton ptychius*, Pilsbry, Nautilus, vol. viii., p. 53.

*Ischnochiton ptychius*, Bednall, Proc. Mal. Soc., vol. ii., part 4, April, 1897.

One specimen of this rare chiton was taken from the anchor of a buoy between Fremantle and Rottnest Island.

9. ISCHNOCHITON VIRGATUS, Reeve.

*Chiton virgatus*, Reeve, Conch. Icon., sp. 192; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 78.

Several specimens were found at the Quarantine Station, Albany. Some of my specimens are of a creamy-white, which may possibly need to be placed under a new species.

10. ISCHNOCHITON THOMASI, Bednall, 1896.

*Ischnochiton Thomasi*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One diminutive specimen was dredged from 20 fathoms in Geographe Bay.

11. ISCHNOCHITON RESPLENDENS, Bednall and Matthews, 1906.

*Ischnochiton resplendens*, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

Several specimens of this beautiful chiton were taken at Yallingup, and an anterior valve at Ellenbrook, both south of Cape Naturaliste, and also at Albany. No specimen of its close ally *I. smaragdinus* was seen.

## 12. CALLISTOCHITON ANTIQUES, Reeve.

*Chiton antiquus*, Reeve, Conch. Icon., sp. 169; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 274.

Specimens were obtained at Albany, Ellenbrook, and Yallingup.

## 13. CHITON TRICOSTALIS, Pilsbry, 1894.

*Chiton (canaliculatus, var. ?) tricostalis*, Pilsbry, Nautilus, vol. viii. (1894), p. 54.

Two specimens from Ellenbrook, south of Cape Naturaliste, one dark olive-green mottled with creamy-white, terra-cotta, and light-green, the other terra-cotta with splashes of red and white.

## 14. CHITON TORRIANUS, Hedley and Hull, 1909.

*Chiton torri*, Hedley and Hull, Records of the Australian Museum, Sydney, vol. vii., No. 4, 1909, p. 162.

*Chiton Hullianus*, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 103.

*Chiton torrianus*, Mal. Soc. Journal, March, 1911, vol. ix., pt. iv.

Numerous specimens of this handsome chiton were taken at Esperance, Albany, Yallingup, Ellenbrook, and Rottnest Island. Valves were plentiful on the beaches. I have them up to 50 mm. in length. It is evidently one of the common chitons of Western Australia.

## 15. CHITON BEDNALLI, Pilsbry, 1895.

*Chiton Bednalli*, Pilsbry, Nautilus, vol. ix., p. 90, December, 1895.

One median valve of this, the most beautiful of all our chitons, was dredged from 20 fathoms in Geographe Bay. Most of the specimens taken in South Australia have been dredged.

## 16. CHITON EXOPTANDUS, Bednall, 1897.

*Chiton exoptandus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One anterior valve and one median valve were taken from 20 fathoms in Geographe Bay.

## 17. LORICA VOLVOX, Reeve, 1847.

*Chiton volvox*, Reeve, Conch. Icon., sp. 31; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 237.

*Chiton cimolius*, Reeve, Conch. Icon., sp. 141.

Valves of this very large species were picked up at Rottnest Island and Ellenbrook, south of Cape Naturaliste.

*Poncet Chiton*

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18. PLAXIPHORA COSTATA, Blain.

*Chiton costatus*, Blain, Diet. Sc. Nat., xxxvi., p. 548; Pilsbry, Man. Conch., vol. xv., p. 105.

*Plaxiphora glauca*, Quoy and Gaim.; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

*Chiton glaucus*, Quoy and Gaim., Voy. Astrolabe, Zool. iii., p. 376.

*Plaxiphora glauca*, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 325.

*Plaxiphora costata*, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 97.

Mr. Iredale says: "Blainville's *costatus* is easily recognizable as the species I have noted as *glauca*, Q. et G." He agrees with Dr. Thiele in his "Revision des Systems der Chitonen" in placing *P. petholata*, Sow., as *albida* of Blainville and *P. glauca*, Q. et G., as *costatus*, Blain.

Good specimens of *P. costata* were found at Rottnest Island, Albany, and Bunbury, and valves were plentiful at Ellenbrook and Yallingup.

I notice that Blainville took *P. costata*, or, as he named it, *Chiton costatus*, from the "Port of King George." Western Australia, therefore, is the first locality where the shell was found. Quoy and Gaimard found it in d'Entrecasteaux Channel, Tasmania.

*Acanthochites*

551

19. ACANTHOCHITES ASBESTOIDES, Smith, 1884.

*Chiton (Acanthochiton) asbestoides* (Carpenter, MS.), Smith, Zool. Coll., H.M.S. "Alert," p. 833; Pilsbry, Man. Conch., ser. i., vol. xv., p. 17.

*Acanthochites asbestoides*, Carpenter; Pilsbry, Proc. Acad. Nat. Sec., Philad., 1894.

Two specimens taken at Albany.

*Acanthochites*

552

20. ACANTHOCHITES SPECIOSUS, H. Adams, 1861.

*Cryptoplax (nolopla) speciosus*, H. Adams, Proc. Zool. Soc., 1861, p. 385.

*Acanthochites speciosus*, H. Adams, Pilsbry, Man. Conch., ser. i., vol. xv., p. 32.

One specimen of this rare shell was found at Rabbit Island, near Albany.

*Acanthochites*

552

21. ACANTHOCHITES VERCONIS, Torr and Ashby, 1898.

*Acanthochites Verconis*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217.

One specimen dredged from 20 fathoms at Geographe Bay. Mr. Hedley, conchologist, of Sydney, is unable to separate *A. Verconis* from *A. Wilsoni*, of Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

## 22. CRYPTOPLAX STRIATUS, Lamarck, 1819.

*Chitonellus striatus*, Lam., An. S., Vert. vi., p. 317, 1819.

*Cryptoplax striatus*, Pilsbry, Man. Conch., ser. i., vol. xv., p. 53.

This chiton was taken at Hopetoun, on the south coast, and at Yallingup, on the west coast. Valves were obtained at Hopetoun, Ellenbrook, and dredged from 20 fathoms in Geographe Bay. I concur with Messrs. Gatliffe and Bastow, of Melbourne, in placing the hairy, seal-like specimens with *striatus* and the hairless one with var. *Gunnii*, of Reeve.

## 23. CRYPTOPLAX STRIATUS, var. GUNNII, Reeve. F51

*Chitonellus gunnii*, Reeve, Conch. Icon., sp. 5.

*Cryptoplex striatus*, var. *Gunnii*, Pilsbry, Man. Conch., ser. i., vol. xv., p. 54.

Two specimens of this hairless species were found at Yallingup. They are both destitute of the "minute calcareous spinelets" of *striatus*. The valves are narrower, and in both specimens of a deep-pink colour. When examined with *striatus* they seem worthy of being placed in a distinct species.

NOTE.—The foregoing 23 species are all found in South Australian waters.

## 24. LIOLOPHURA GEORGIANUS, Quoy and Gaimard, 1835.

*Chiton Georgianus*, Quoy and Gaim., Voy. "Astrolabe," Zool., 1835, iii., p. 379, t. 75, f. 25-30.

*Liolophura Georgiana*, Quoy and Gaim.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 241.

*Chiton Georgianus*, Iredale, Proc. Mal. Soc., London, vol. ix., part 3, September, 1910.

The type specimen was found by Quoy and Gaimard at King George Sound, South-west Australia (Port du Roi-Georges). Mr. Iredale says that the type appears to have been lost. It is the commonest chiton in Western Australian waters. The specimens I have dissected correspond to Quoy and Gaimard's description. It certainly is not a true chiton, and I have not been able to discover the presence of eyes necessary to place it among *Liolophura*; but this may be accounted for by the fact that it is exceedingly difficult to get a clean specimen. They are either very much eroded or covered with calcareous matter and other foreign growths.

I have been assisted in my nomenclature by Messrs. Hedley and Hull, of Sydney.

*L. georgiana* was seen in every place visited, Esperance, Albany, Ellenbrook, Yallingup, and Rottnest Island. Some years ago one specimen with the girdle removed was sent to

me from Eyre Patch, Western Australia, not far from the South Australian boundary. It is often found high and dry in crevices of rocks at and above high-water mark. It is remarkable that no specimens have been discovered in South Australian waters when it is so common in Western Australia. It occupies a similar position in Western Australia to that taken by *Plaxiphora albida* in South Australia.

The figure in Pilsbry, vol. xiv., plate 53, figs. 36-40, shows the concentric marking and the beaks of the valves very distinctly. My specimens are nearly all much worn, and only a few valves retain the beak; the more perfect specimens show both the beak and rows of concentric polished pustules on the anterior valve, radiating from the apex.

*Sociabilis*  
25. ONITHOCHITON QUERCINUS, Gould, 1846.

F574

*Chiton querceanus*, Gould, Proc. Bost. Soc. Nat. Hist., 1846, vol. ii., p. 142; U.S. Expl. Exped. Moll., p. 312, figs. 437, 437a; *Otia, Conch.*, p. 3.

*C. (Onithochiton) querceanus*, Gould, *Otia, Conch.*, p. 242.

*C. Incii*, Reeve, *Conch. Icon.*, 1847, No. 94.

*Onithochiton rugulosus*, Angas, P.Z.S., 1867, pp. 115, 223.

*O. Incii*, Angas, P.Z.S., 1867, p. 223.

*O. Lyelli (non Sow.)*, Pilsbry, *Man. Conch.*, vol. xiv., p. 247.

*O. querceanus*, Gould; Pilsbry, *Man. Conch.*, vol. xiv., p. 248.

*O. rugulosus*, Angas; Pilsbry, *Man. Conch.*, vol. xiv., p. 249; Proc. Acad. Nat. Soc., Phil., 1894, p. 88.

*O. Incii*, Reeve; Thiele, *Zoologica Chim.*, Heft. Ivi., p. 99.

*O. querceanus*, Gould; Iredale, *Proc. Mal. Soc.*, London, vol. ix., part 2, June, 1910.

Specimens of this very beautiful chiton were taken at Esperance, Albany, Ellenbrook, and Rottnest Island. On the outlying reefs at Rottnest they could be seen crawling over the reefs very energetically. Gould's type specimen was a small one—length, 22 mm.; breadth, 15 mm. I have a dried specimen, slightly curled, taken at Port Esperance—length, 52 mm.; breadth, 23 mm. It is beautifully coloured. Those found on exposed rocks were covered with foreign matter. I have to thank Messrs. Hedley and Hull for the identification of this species.

Unfortunately I have not had access to a description of *Onithochiton Scholviensi*, Thiele, Zool. Chun. 1909, Heft. Ivi., p. 99. Mr. Iredale says in the paper quoted that the specimens in the British Museum are labelled "West Australia." He thinks that is correct. My specimens of *O. querceanus* vary considerably. It is possible that I may be able to place some of them with *Scholviensi*.

## 26. ISCHNOCHITON VERCONIS, sp. nov.

Plate xxiv., figs. 1a,b,c,d,e,f.

F47

Mr. Hedley says: "This is certainly a new species and a magnificent one. One would need to disarticulate a valve to be sure of the classification. Probably it is an *Ischnochiton*, and perhaps of the section *Ischnoradsia*." As only one specimen was found I am not disarticulating, but hope to supplement my description later.

*General Appearance.* Shell elliptical, flattened, side slopes curved. Colour, uniformly slate-grey, tending to heliotrope. Girdle and valves of the same colour.

*Anterior Valve.* No very distinct markings. Surface rough with irregular concentric growth lines and minute longitudinal striae. Eight teeth.

*Posterior Valve.* Muco-median, prominent; divided into two distinct areas by a slightly-raised riblet running up to the muco. The anterior half has longitudinal colour markings with microscopic nodulose lines. To the unaided eye it seems smooth. The posterior half has concentric irregular nodulose lines similar to the anterior valve.

*Median Valve.* The pleural and dorsal areas run together, while the lateral area is very distinct. The dorsal area is smooth, horny, with brown-pencilled longitudinal lines and microscopic zigzag striations. The pleural area has very delicate longitudinal markings. The lateral area is distinctly raised and has a lighter shade of colour than the pleural. The very slight longitudinal and lateral markings give it a textile appearance.

*Girdle.* Clothed with imbricating scales, curved, apices suberect; under the microscope the scales are beautifully frosted over and show about ten transverse parallel grooves. The girdle is one-third of the depth of the lateral area, about 3 mm. across.

*Interior.* Bluish-grey colour with broad sinus and dark splashes near the sinus of each valve. The anterior valve has delicate brown pencillings from the sinus to half its depth with eight riblets.

*Measurement.* Dried specimen. Length, 44 mm.; breadth, 28 mm.

*Habitat.* Rockpool, inside reef, Ellenbrook, south of Cape Naturaliste, Western Australia.

*Remarks.* It is different in shape from any Australian Ischnochitons, and the only specimens in my collection of similar shape are *Mopalia lynosa*, Gould, from California, and *Chiton Magnificus*, Deshayes, from the Philippines. This species has been named after Dr. Verco, to whose generosity

I have been indebted for the opportunity of exploring Western Australian *Polyplacophora*.

27. *PLAXIPHORA HEDLEYI*, sp. nov.

Plate xxiv., figs. 2a,b,c,d,e,f.

F646

*General Appearance.* Shell ovate, narrowing toward the anterior side slopes curved. Colour pale-green with five black and white zebra stripes in the pleural area. The articulum is a milky-white with dark splashes at the sutures.

*Anterior Valve.* Radially ribbed with eight rounded costæ dying off toward the apex. These correspond with the eight slit rays in the interior of this valve.

*Posterior Valve.* Insertion plate smooth, unslit, like all plaxiphora. Sinus broad and rounded. Insertion plates large. Colour, milky-white, splashed with brown and black stripes.

*Median Valve.* Dorsal area beaked, forming an equilateral triangle, with a central ridge almost smooth and splashed longitudinally on its posterior margin, with black-and-white stripes varying in different valves. In one valve microscopic striae run out diagonally from the central area. To the unaided eye the dorsal area is pale-green, smooth, and horny. The division between the dorsal and pleural areas is distinctly marked by five white and five black zebra bands, small toward the apex and lengthening toward the girdle. The pleural and lateral areas seem to run into one another, a slightly raised radial rib marking the division. The pleural and lateral areas have a mottled appearance, with splashes of brown and white or black and white. The internal part is a milky-white with a distinctly-raised rib, broad at the apex and narrowing off to one tiny slit. The sinus is broad and the sutural plates neatly curved.

*Girdle.* Leathery with microscopic granulations. Narrow with sutural horny protuberances, some spikes remaining. Colour alternately black and white, black at the valves and white at the sutures, 11 or 12 stripes of each colour on each side.

*Measurement.* Dried specimen. Length, 16 mm.; breadth, 11 mm.

*Habitat.* Rabbit Island, Albany. Two live specimens and one median valve.

*Remarks.* This specimen has been named after Mr. Hedley, conchologist, whose wide conchological information has helped many a beginner. The zebra-like stripes will cause this specimen to be easily distinguished.

## 28. ACANTHOCHITES SUBVIRIDIS, sp. nov.

Plate xxv., figs. 3a,b,c,d,e,f.

*General Appearance.* Shell elongated, narrow, carinate, side slopes curved. Colour creamy-white with a pale-green tint on some of the valves, a brighter green on the dorsal area with a pink-tipped beak in some specimens; girdle dark-buff.

*Anterior Valve.* Strongly marked with fine granulose, radiating costæ corresponding to the five slit rays. The sutural plates are much larger than the tegmentum. Internally milky-white with a curved sutural band.

*Posterior Valve.* Distinctly marked with dorsal and latero-pleural areas. The dorsal area is a smooth ridge, irregularly transversely striated, terminating in fine radial riblets, which are continued in the sutural plates as slit rays. The latero-pleural area is covered with squamose granules. Sutural plates large, sinus wide.

*Median Valve.* Dorsal and latero-pleural areas same as posterior valve with the exception of two post-median granulose radial riblets, one on the anterior margin. In some specimens these riblets are strongly pustulose, small at the apex, and increasing in size toward the margin. Internally one slit ray, sutural plates large, sinus medium. The dorsal area is a pale-green colour, with in some cases a pink tip. In others it is a dark-buff.

*Girdle.* Leathery, very broad, 7 sutural tufts on each side, and 4 round the anterior valve. Elementary spicules may be seen in one or two. Colour dark-buff, resembling the girdle of *Cryptoplax Gunnii*.

*Measurement.* Length, 22 mm.; breadth, 12 mm.

*Habitat.* Four specimens from Rabbit Island, Albany.

*Remarks.* I was very much inclined to place this specimen under *A. costatus*, Ad. and Ang., Pilsbry, Man. Conch., ser. i., vol. xiv., p. 40, but the distinctly pustulose riblets and coloured dorsal areas with other minor differences have led me to place it under a new species. Adams and Angas' drawing of *A. costatus* gives a very diminutive riblet. The minute fringe of white spicules, described by E. A. Smith, Zool. Coll. "Alert," p. 83, t. 6, f. F., as *Chiton (Macandrellus) costatus*, is absent in all the specimens. The greenish tint so common has given its name, *subviridis*.

## 29. TONICIA HULLIANUS, sp. nov.

Plate xxv., figs. 4a,b,c,d,e,f.

F558-9

*General Appearance.* Shell elliptical, broad, smooth, back rounded, side slopes curved, valves distinctly beaked.

Colour reddish-buff, mottled on dorsal areas, turning to deep-red on some of the lateral areas, a few minute irregular black and white spots. Second valve larger than any of the following five. The forward part of the lateral areas and the posterior and anterior valves bear radiating rows of eye-dots.

*Anterior Valve.* About 15 or more fine striæ radiating from the apex with a slightly raised rib between each pair. These rays are really the eye-dot lines. I counted 15 eyes in one ray. There seems to be on either side a sort of flesh-coloured lateral area. The rest of this valve is a pale-pink, mottled with cream. Dentition: Eight slits are distinctly visible, but as I have only one specimen I have not dissected it. The insertion teeth are pectinated.

*Posterior Valve.* Large, mucro median *rectangularly elevated*. The dorsal area is smooth, beaked with irregular lateral striæ. The eye-dots radiate from the mucro to the insertion plate. Colour dorsal and posterior area pink, mottled with cream, and on each side corresponding to the lateral area which is of a rich red colour. The insertion plates are pectinated with probably a dozen slits.

*Median Valves.* Dorsal area is V-shaped, curved, and beaked, colour pinky-buff, mottled with cream. Pleural area small, flesh- or buff-coloured, depressed with concentric growth lines running from lateral into pleural and dorsal areas. Lateral areas, some flesh-coloured, others mottled as in the dorsal areas, five or six irregular flattened ribs. Eye-dots irregular on the anterior half of each valve. Insertion plates, one slit, pectinated. The sutural plates are diminutive, sinus shallow and pectinated, and the interior is porcelain-white.

*Girdle.* Leathery, nude. Breadth in dry state, 2 mm. Colour light-brown.

*Measurement.* Dried specimen. Length, 30 mm.; breadth, 20 mm. Divergence, 125°.

*Habitat.* Rockpool, Ellenbrook, south of Cape Naturaliste. One live specimen and one median valve.

*Remarks.* The Genus *Tonicia* is somewhat rare in Australian waters. I have named this very handsome species after Mr. A. F. Bassett Hull, whom Mr. Iredale describes as "the most enthusiastic chiton student in Australasia."

### 30. *LEPIDOLEURUS NIGER*, sp. nov.

Plate xxv., figs. 5a,b,c,d,e,f.

*General Appearance.* Shell small, broad in proportion to length. Valves rounded and raised. Regular granulose striations are microscopically conspicuous. Colour dark

slatish-grey on anterior and 5 median valves, posterior valve almost black.

*Anterior Valve.* Longitudinally parallel rows of pustules.

*Posterior Valve.* Almost black; umbo postmedian, with concentric pustulose striae.

*Median Valves.* Regularly longitudinally granulosely striated. No difference in the dorsal, lateral, and pleural areas.

*Girdle.* Diminutive, dark, scaly, and with spicules.

*Habitat.* Under stones in shallow pools at Hopetoun, Western Australia. Only one specimen was found.

*Measurement.* Dried specimen. Length, 4 mm.; breadth,  $2\frac{1}{2}$  mm.

*Remarks.* I had classified this as *L. Matthewsianus*, Bednall, which is so common in South Australian waters, but on comparing them I found it much broader in proportion to its length, and the body of the animal which is uniformly red in *L. Matthewsianus* is almost black in *L. Niger*. I then placed it with *L. Badius*, Hedley and Hull, and found it very similar, with the exception that the grain rows were distinctly regular. Its dark appearance has given its name.

31. PLAXIPHORA ZEBRA, *sp. nov.*

Plate xxv., fig. 6.

F546

A beautiful median valve was collected at Port Esperance and is worthy of a name. The valve is rounded. The *dorsal area* is indistinct with 10 irregular creamy tear-drop pustules in the centre forming a V with diagonal striations terminating in the anterior part of the valve. The lateral part of the dorsal area has three or four transverse striae continued into the pleural area. The colour is a delicate pink, mottled with white and brown splashes. The *pleural area* has a number of zigzag pustulose riblets running into the striations coming from the dorsal area and narrowing toward the apex. Colour: Five alternate splashes of bright-red and creamy-white give the shell its name. The lateral area is distinctly raised with two rows of 9 or 10 large pustules on its anterior and posterior margins with a sulcus between, irregularly pustulose and striated. The pustules have the tear-drop appearance of those in the dorsal area. Interior is porcelainous, sinus curved, broad, shallow, and pectinated. The sutural plates are small, one slit. The anterior part of the valve is folded over and an irregular sulcus is formed, terminating in the slit. The specimen may have been bleached, so that the pink splashes in the pleural area may have been brown or black.

The markings are very like *P. Hedleyi*, but the lateral area makes a distinct species.

*Habitat.* Port Esperance. One median valve.

32. *Plaxiphora pustulosa*, sp. nov.

Plate xxv., fig. 7.

F 570

One median valve was taken at Albany and is in perfect condition. The valve is slightly arched and beaked. The posterior part of the dorsal area has 12 bright-brown transverse riblets divided by pale-green striae, rather crowded toward the posterior. These riblets are continued into the pleural area in rows of bright shiny pustules, longitudinally parallel, and diminishing in number from seven near the dorsal area to one at the insertion plate. The lateral area is slightly raised, but very distinct. It has three or four radiating rays of the tear-drop pustules.

*Interior.* The sinus is gracefully curved, colour rich dark-brown, slightly pectinated. The sutural plates are small. The rear part is folded over, making a white limy sulcus, ending in one slit at the insertion plate.

*Habitat.* Albany, Western Australia. One median valve.

Brighton,  
South Australia.

#### EXPLANATION OF PLATES.

##### PLATE XXIV.

- 1a,b,c,d,e,f—*Ischnochiton verconis*, sp. nov.  
2a,b,c,d,e,f—*Plaxiphora hedleyi* sp. nov.

##### PLATE XXV.

- 3a,b,c,d,e,f—*Acanthochites subviridis*, n. sp.  
4a,b,c,d,e,f—*Tonicia hultianus*, sp. nov.  
5a,b,c,d,e,f—*Lepidopleurus niger*, sp. nov.  
6—*Plaxiphora zebra* (median valve), sp. nov.  
7—*Plaxiphora pustulosa* (median valve), sp. nov.

a—Dorsal view of entire shell.  
b—Anterior valve.

c—Median valve.

d—Posterior valve.

e—Lateral view of posterior valve.

f—Portion of girdle magnified.

Sizes of type specimens are marked in each case

**NOTE DESCRIPTIVE OF A STEREOGRAM OF THE  
MOUNT LOFTY RANGES, SOUTH AUSTRALIA.**

By W. N. BENSON, B.Sc.

[Read August 10, 1911.]

PLATES XX. AND XXI.

In a previous paper a short outline was given of the physiography of the Mount Lofty Ranges as it appeared to the writer from observations made during 1908.<sup>(1)</sup>

Recently a stereogram has been constructed for the Sydney University to illustrate the features on which his conclusions were based. A brief description of this model may not be out of place here. The information on which it was modelled was obtained from the official map of south-eastern South Australia and the topographic map of the vicinity of Adelaide. Trigonometrically-determined heights are sadly few in number. The general relief of the area between Noarlunga, Angaston, and Murray Bridge, and in the Inman Valley is based on the writer's own sketches and aneroid readings. A topographic map of Mount Barker district published in the daily Press during the military manœuvres of 1908 was also of service. The modelling of the area about Mount Compass is based on Mr. Howchin's map and descriptions<sup>(2)</sup> and additional information kindly supplied by him.

Owing to the writer's non-acquaintance with areas outside these limits the model may be subject to some modification in those parts, and indeed owing to the smallness of scale no more than a very rough accuracy has been attempted throughout.

The small inset model illustrates the main tectonic features. As these are being investigated in detail by Mr. Howchin a very brief description will here suffice.

The main portion of the Mount Lofty Ranges, stretching from beyond Angaston to Cape Jervis and extending into Kangaroo Island, is a peneplain. The main drainage, before uplift, was in mature valleys running in an approximately meridional direction.<sup>(3)</sup> On the peneplain surface were residuals of a higher level, monadnocks, such as Mounts

(1) Trans. Roy. Soc., S.A., 1909, p. 107.

(2) Trans. Roy. Soc., S.A., 1910, pp. 231-47 and pls. xxxi. to xliv.

(3) W. Howchin, Geography of South Australia, p. 124.

tarsis posticis quam tibiæ vix brevioribus, articulis 1-4 gradatim brevioribus; unguiculis modice magnis. Long.,  $5\frac{1}{2}$  l.; lat.,  $2\frac{3}{5}$  l.

South-West Australia (Nullarbor Plains); given to me by Mr. French.

**ANTOLIGOSTETHUS (gen. nov.).**

Caput antice perpendiculare; labrum fortiter transversum; antennæ sat fortiter serratae, articulis 3<sup>o</sup> quam 2<sup>us</sup> multo longiori, 11<sup>o</sup> subappendiculato; prothorax a basi ad apicem angustatus, ad latera marginatus, margine antice fortiter deflexo (superne viso haud perspicuo); prosternum antice rotundatim truncatum, suturis sinuatis antice clausis haud duplicatis; tarsi subtus haud laminati; coxae intermediae contiguae.

The characters cited above will serve in combination to distinguish this genus from all those described in the "Genus Insectorum." It is probably nearest to the South African genus *Oligostethus*, Schw., but differs from it by, *inter alia*, the antennæ strongly serrate from the 3rd joint inclusive, the strongly transverse labrum, and the prosternal sutures not open in front.

1. *lucidus*, sp. nov. Brunneo-testaceus; sat nitidus (præsertim pronotum); supra pilis brevibus erectis sat dense vestitus; antennis ultra prothoracis basin elongatis; capite crebre fortiter punctulato; prothorace quam trans basin latiori parum breviori, supra in disco sparsius subtilius (quam caput multo minus crebre multo minus fortiter) latera summa versus magis fortiter punctulato, antice sat fortiter angustato, margine antico rotundatim sat fortiter producto, lateribus fere rectis nonnihil sinuatis, angulis posticis haud divaricatis intra marginem haud carinatis; scutello ovali; elytris quam prothorax circiter triplo longioribus, sat fortiter striatis, striis latera versus fortiter punctulatis, interstitiis parum convexis sat crebre minus subtiliter punctulatis, apice vix acuminato fere rotundato; prosterno crebre fortiter, episternis sparsim subtilius, punctulatis; processu prosternali supra concavo, postice abrupte declivi; coxis intermediis contiguis; coxis posticis intus gradatim sat fortiter dilatatis; abdome sat crebre sat fortiter punctulato; tarsis posticis quam tibiæ paulo brevioribus, articulis 1-4 gradatim brevioribus; unguiculis modice magnis. Long.,  $5\frac{1}{4}$  l.; lat.,  $1\frac{1}{2}$  l.

North-West Australia; Roebuck Bay.

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA  
WITH DESCRIPTIONS OF NEW SPECIES.—PART XIV.

By Jos C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 12, 1911.]

PLATES XXVI. AND XXVII.

Genus DENTALIUM.

Since 1904, when I wrote a paper on *Dentalium intercalatum*, Gould. (Trans. Roy. Soc., S.A., 1904, vol. xxviii., p. 135), I have dredged in deeper waters, up to 300 fathoms, and have explored the coastline and dredged up to 35 fathoms as far west as St. Francis Island in Nuyts Archipelago, and Point Sinclair; also at Esperance Bay, King George Sound, Ellensbrook, Yallingup, off Bunbury in Geographe Bay, and at Rottnest Island, and off Fremantle in Western Australia.

As a great amount and a much varied kind of material has thus been accumulated I propose to review my previous Notes on *Dentalium* and other South Australian genera in the light of these collections.

Bossevain in "Scaphopoda of the Siboga Expedition, 1906," p. 22, under *Dentalium intercalatum*, Gld., reproduces my paper from the Trans. Roy. Soc. of S.A.

In the paper on *D. intercalatum*, Gld., referred to I write:—"I have vainly endeavoured to discover more than one species among them. They are exceedingly variable, and were it not for intermediate forms quite a dozen species might be created." In going through the literature of *Dentalium* several species already created may from the description and figures be matched by my specimens, and so would seem to be but variations of the one abundant and protean species. Among these are the following:—

***Dentalium duodecimcostatum*, Brazier.**

*Dentalium duodecimcostatum*, Brazier, Proc. Linn. Soc., N.S.W., vol. ii., 1877, p. 56. *Type locality*—Darnley Island, Torres Straits, 30 fathoms, sandy mud (Chevert Exped.); Pilsbury, Tryon, Man. Conch., 1897-8, vol. xvii., p. 13; Hedley, Records Austr. Mus., 1901, vol. iv., p. 128, pl. xvii., fig. 31; Bossevain, Scaphopoda of Siboga Exped., 1906, p. 15.

Dredged in 22 fathoms in Gulf St. Vincent, 22 in good condition, some alive.

The only difference between the unique type specimen and mine is that the latter attain the length of only 9 lines instead of 11.

**Dentalium cheverti**, Sharp and Pilsbry.

*Dentalium cheverti*, nom. mut., Sharp and Pilsbry, Tryon, Man. Conch., 1897-8, vol. xvii., p. 9; Hedley, Records Austr. Mus., 1901, vol. iv., No. 3, p. 129, pl. xvii., fig. 34; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 17.

*Dentalium septemcostatum*, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 57 (nom *D. septemcostatum*, Abich, 1859). Type locality—Evan Bay, Cape York, North Australia, 6 fathoms, sand (Chevert Exped.).

Dredged in 22 fathoms in Gulf St. Vincent, 2 in good condition, 13 mm. long.

**Dentalium katowense**, Brazier.

*Dentalium katowense*, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 56. Type locality—Katow, New Guinea, 8 fathoms, sandy mud and coral; Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 9; Hedley, Records Austr. Mus., 1901, vol. iv., No. 3, p. 129, pl. xvii., fig. 33; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 16.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 4 in good condition. The longest is 22·5 mm. Mr. Hedley writes: "This answers fairly to my specimens from the Gulf of Carpentaria."

Brazier in the definition of his species writes, "interstices with minute lengthened striae." If the specimens of *D. intercalatum*, Gld., from South Australia are carefully examined under a lens when their larger end is toward the light they will show their transverse incremental striae very plainly, but when they lie with their side toward the light these are quite indistinct, and fine axial striae are visible. The relative validity of these axial and concentric striae varies in different examples. They are to be seen in my specimens labelled *D. katowense*.

**Dentalium thetidis**, Hedley.

*Dentalium thetidis*, Hedley, Memoirs Austr. Mus., 1903, vol. iv., p. 327, fig. 61. Type locality—"In 63-75 fathoms off Port Kembla; also in 41-50 fathoms off Cape Three Points."

Dredged in 6 fathoms off Black Point, Gulf St. Vincent, 1 fresh; in 15 to 22 fathoms Gulf St. Vincent, 2 good; in 130 fathoms off Cape Jaffa, 2 fresh, 7 dead; in 300 fathoms off Cape Jaffa, 3 dead. Identified by eotypes from Mr. Hedley. In the two fresh specimens from 130 fathoms, close to the posterior end, in the furrow on each side next to the central furrow on the convex surface, are four minute holes in an axial line. These are probably only accidental. They may be the boreholes of predacious molluscs. Still it is a curious coincidence to find them in two specimens, in identically the same position; and the coincidence is more striking

since they occur only in these two instances, among several hundred *Dentalium* shells. These are often bored, but generally only in one or two holes and in other parts of the shell. However, it would be perilous to construct another species to include these two examples, which in all other respects resemble the rest under this name. My longest individual measures 20 mm. by 2·25 mm. Hedley's type is 8 mm. by 1 mm., and probably immature.

***Dentalium bednalli*, Pilsbry and Sharp.**

*Dentalium bednalli*, Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 248, pl. xxxix., figs. 1, 2, and 3. *Type locality*—Gulf St. Vincent, South Australia. (?) *D. octogonum*, Lam., Angas, Proc. Zool. Soc., 1878, p. 868; Adcock, Handlist Aquatic Moll., S.A., 1893, p. 10.

Dredged in 15-22 fathoms in Gulf St. Vincent, 59 specimens with 7 ribs posteriorly and a varying number anteriorly; after the previous 7-angled varieties have been picked out.

***Dentalium octopteron*, n. var.**

This shell is like *D. bednalli*, Sharp and Pilsbry, except that it has 8 ribs at the posterior end instead of 7. In 4 specimens the 8 costæ run throughout the shell, which may measure 20 mm. in length. But in all the others riblets arise; it may be in only one or in two, or up to all the intercostal spaces. These riblets may number as many as 4 in a space; they may equal in size the primary ribs, if they are few, or they may remain small, especially if numerous.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 88 in good condition. This variety is the most common in our shallower waters, and this would be the form found by Angas on Henley Beach and named by him *D. octagonum*, Proc. Zool. Soc., 1878, p. 868.

Type in Dr. Verco's collection.

***Dentalium robustum*, Brazier.**

*Dentalium robustum*, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 56. *Type locality*—Katow, New Guinea, 8 fathoms, sandy mud and coral (Chevert Exped.); Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 12; Hedley, Records Aust. Mus., 1901, vol. iv., No. 3, p. 128, pl. xvii., fig. 32; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 29.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 16 in good condition. These, like the type, have 9 ribs throughout. Besides these 28 other specimens from the same locality have 9 ribs posteriorly and more than 9 anteriorly.

**Dentalium decemcostatum**, Brazier.

*Dentalium decemcostatum*, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 55. Type locality—Katow, New Guinea, 8 fathoms, sandy mud (Chevert Exped.); Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 8; Bossevain, Seaphopoda, Siboga Exped., 1906, p. 27.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 10 good; with 10 ribs throughout, with 10 ribs posteriorly, and more than 10 anteriorly, 24 good.

**Dentalium francisense**, n. sp. Pl. xxvi., figs. 1 and 1a.

Shell moderately solid, narrow, curved, less anteriorly, translucent white, with 14 broad, low, round ribs extending throughout, separated by distinct linear interspaces. Fine transverse microscopic growth lines. Anterior aperture circular, margins thin, scarcely scalloped. Posterior end truncate, aperture small, border thick, shape oval, elongate antero-posteriorly.

*Dimensions*.—Length, 28 mm.; diameter—anteriorly, 3·2 mm.; posteriorly, 1·6 mm. A much younger individual measures 13·5 mm. in length, 2·4 mm. in its anterior diameter, and 8 mm. in its posterior. It is much more curved and has a slightly projecting appendical tube.

*Locality*.—In 15 to 20 fathoms in Petrel Bay, St. Francis Island, type with 4 others (2 alive); in 35 fathoms off St. Francis Island, 1 good; in 15 to 22 fathoms in Gulf St. Vincent, 9 good; in 55 fathoms north-west of Cape Borda, 1 good; in 15 fathoms in Geographe Bay, Western Australia, 1 good.

This shell varies. There may be only 11 ribs throughout, of which I have two examples from Gulf St. Vincent, or 11 ribs posteriorly, and more anteriorly up to 22 from intercalated riblets, 13 examples from the same locality.

There may be 12 ribs posteriorly and 12 anteriorly, and these may be typically broad and round, or rather narrow and flat, 4 examples; or of intermediate width, 9 examples; or 12 ribs posteriorly and 2 or more additional riblets anteriorly, 4 examples, all dredged in 15 to 22 fathoms in Gulf St. Vincent.

There may be 13 ribs throughout, as in 11 examples from 15 to 22 fathoms in Gulf St. Vincent.

There may be 15 ribs throughout, as in 9 examples from 15 to 22 fathoms in Gulf St. Vincent.

There may be 18 ribs throughout, as in 1 example from Port Lincoln, but this is a large old individual, with a relatively great posterior diameter, and probably had fewer ribs earlier in life.

Type in Dr. Verco's collection.

I am inclined to think that even this species is but an extreme variant of the *D. intercalatum*, Gld. It would seem as though the more initial ribs are present at the posterior end, the fewer interstitial ribs arise, which is easily understood; and the more likely they are to be round and broad and encroach on the intercostal spaces. Still one may meet with an occasional specimen starting with 11 ribs which increase up to 24, and are rather narrow; or with one which starts with only a few ribs, 7 or 9, and these become broad and rounded.

The following species of *Dentalium* appear to be distinct from *Dentalium intercalatum*, Gld., with its many varieties:—

***Dentalium hemileuron*, n. sp.** Pl. xxvi, fig. 2.

Shell long and narrow, very slightly curved, mostly at the hinder part, white opaque when dead, translucent when fresh, and glistening, rather thick. There are 10 axial ribs, valid, narrow, about one-fourth the width of their interspaces, less valid and less distant on the convex side. Well developed in the posterior half, then becoming quickly obsolete and absent from the anterior third. There is no increase in number as the shell grows larger, close transverse scratch marks, and circles of varying opacity make the ornament. Anterior aperture round. Posterior aperture round, but on the convex surface it has a sinus about as deep as wide with convex margins.

*Dimensions*.—Length, 30 mm.; greatest width, 2·4 mm.; smallest, ·4 mm.

*Locality*.—Dredged in 300 fathoms off Cape Jaffa, type with 20 in good condition (some alive), 51 in poor; in 130 fathoms off Cape Jaffa, 37 (some alive); in 150 fathoms off Beachport, 1 poor; in 200 fathoms, 1 moderate.

In a young individual the ribs are traceable to within 2 mm. of the end, where the diameter was only 3 mm., beyond which ribs were absent and only transverse scratchings were visible; the extreme 2 mm. cap, as it were, the part beyond. The largest example measures 34 mm. Some have 9 ribs, some 8, some 11.

*Diagnosis*.—There are no axial interstitial riblets as in *D. thetidis*, Hedley, nor increase in the number of ribs by splitting or intercalation, as in *D. intercalatum*, Gld., and the anterior part is ribless.

Type in Dr. Verco's collection.

**Dentalium zelandicum, Sowerby.**

*Dentalium zelandicum*, Sowerby, Thes. Conch., 1860, vol. iii., p. 101, sp. 31, pl. cxxiii., fig. 13. *Type locality*—New Zealand; Reeve, Conch. Icon., 1872, vol. xviii., pl. ii., fig. 8; Lesson, Conch. Cab. (Ed. Küster), 1896, Band. vi., Abt. 5, p. 15, sp. 23, pl. iv., fig. 4; Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 70, pl. vi., fig. 81; Murdoch and Suter, Trans. New Zealand Institute, 1905, vol. xxxviii., p. 304, 110 fathoms off Great Barrier Island. It is from one of these specimens kindly given me by Mr. Suter that mine are identified.

Dredged in 130 fathoms off Cape Jaffa, 5 good and 12 fragments; in 110 fathoms off Beachport, 1 dead; and in 200 fathoms, 1 fragment large but eroded.

The radula, pl. xxvii., fig. 7, has the formula 1.1.1.1.1., with a wide low central cusp, a lateral provided with several small denticles at its inner lower part, and an oblong rhomboidal marginal.

My largest specimen attains a length of 55 mm., with a width of 6 mm., and has 32 axial ribs, the smaller of which arise by intercalation. A specimen of 20 mm. in length, with about 2 mm. of the apical end unsculptured, has a distinct fissure of 4.75 mm. long on the convex surface; another of the same size and age shows none; a third younger still has 4 mm. unsculptured and no fissure. The fissure in this section of *Dentalium* appears to be only occasionally and not always present; just as does the appendical tube in another section.

**Dentalium virgula, Hedley.**

*Dentalium virgula*, Hedley, Memoirs Austr. Mus., vol. iv., 1903, p. 328, fig. 62. *Type locality*—“Numerous examples were taken in 63-75 fathoms off Port Kembla, in 41-50 fathoms off Cape Three Points, in 54-59 fathoms off Wata Mooli, and in 50-52 fathoms off Botany Bay.”

Dredged in 60 and 62 fathoms off Cape Borda, 43 moderately good; in 90 fathoms off Cape Jaffa, 23 alive and many dead and pieces; in 104 fathoms south-west of the Neptune Islands, 7 good, 44 moderate; in 110 fathoms off Beachport, 4 alive, 21 dead; in 130 fathoms off Cape Jaffa, 3 moderate; in 150 fathoms off Beachport, 93 moderate; in 200 fathoms off Beachport, 4 poor.

Some examples have slight annular constrictions at intervals of 3 mm. Here the shell is less opaque-white, and the opacity gradually increases anteriorly, as though at the constriction the shell were thinner, representing a more rapid growth after a period of lessened activity or of rest. The appendix is visible in very early life, when the shell is extremely narrow. There seems to be a great tendency to transverse fracture when the shell is nearly filled up by in-

ternal deposit, so that numerous fragments are found from 3 mm. upwards in length, and with the appendix projecting, resemble candle-ends. When the appendix is absent in the early stages of growth the shell is not unlike juvenile *D. lubricatum*, Sowerby, but does not increase quite so rapidly, and has more marked transverse striation.

**Dentalium lubricatum**, Sowerby. Pl. xxvi. figs. 4 and 4a.

*Dentalium lubricatum*, Sowerby, Thes. Conch., vol. iii., 1860, p. 97, sp. 3, pl. ccv., fig. 56. Type locality Australia; Reeve, Conch. Icon., vol. xviii., 1872, pl. vii., fig. 55; Brazier, Proc. Linn. Soc., N.S.W., vol. ii., 1878, p. 370; Lesson, Conch. Cab. (Ed. Küster), Band. vi., Abt. 5, 1896, p. 14, sp. 22, pl. iv., fig. 3; Pilsbry, Tryon, Man. Conch., vol. xvii., 1897, p. 110, pl. xix., fig. 22; Hedley, Memoirs Austr. Museum, vol. iv., 1903, p. 328; Pritchard and Gatliff, Proc. Roy. Soc., Vic., vol. xv. (N.S.), 1903, part 2, p. 222.

Sowerby's definition in full is "shell polished, elongate, white, subpellucid, slightly curved, scarcely fissured, gradually increasing." Brazier adds "off Port Jackson Heads, 45 fathoms, hard sand bottom. This fine shell was obtained when H.M.S. 'Challenger' dredged one day off Sydney Heads." Lesson says the apex is whole and is not incised, but gives no authority, whereas Sowerby defines it as "scarcely fissured." Pilsbry supplies the dimensions of Sowerby's figure, "length, 64 mm.; greatest width, 6 mm.," but it is not known whether the figure was only life size.

Hedley records the species:—"Several specimens were obtained from 63-75 fathoms off Port Kembla, of which the largest is 32 mm. long; and from 41-50 fathoms off Cape Three Points; Pritchard and Gatliff extend the locality to Cowes, Port Phillip Island, Western Port."

Dredged in 40 fathoms off Beachport, 6 good; in 55 fathoms off Cape Borda, 7 good and 7 poor; in 60 and 62 fathoms off Cape Borda, 30 good of varying size and 93 immature; in 90 fathoms off Cape Jaffa, 6 good and 3 poor; in 104 fathoms 35 miles south-west of the Neptune Islands, 2 good and 18 poor and immature; in 110 fathoms off Beachport, 3 good and mature; and in 150 fathoms, 1 moderate. No living examples were taken.

With reference to the slit my material shows that in the very early stage of growth there is no slit, but a central posterior aperture; the length of the slit may vary from a mere notch to a fissure of 2·5 mm. in length in a shell of 36·5 mm., or of 8 mm. length in an individual of 26·5 mm. It is always on the convex or ventral aspect. It is sometimes a mere crack, the two sides of which seem in apposition. At others it is an open slit of nearly  $\frac{1}{2}$  mm. in width; or the posterior

third may be a slit and the anterior two-thirds a crack; and this crack may seem to be wider inside the shell, as though it were absorbed from within; and sometimes the crack connects two or three holes where the erosion has come through. In two examples there project from the posterior end on each side a short lamina about  $\frac{1}{2}$  mm. long, a continuation of the internal layer of the shell. The largest individual dredged is 36·5 mm. long and 3·25 mm. at its widest part. In some examples the dorsal part near the posterior end is spotted or blotched with opaque-white.

I was fortunate enough to dredge two specimens which show the extreme posterior end, figured in pl. xxvi., fig. 4a. It is an elliptical bulb, and has a very short, slightly-contracting, round tubular posterior prolongation set somewhat obliquely to the axis of the bulb, and directed toward the convex side of the shell. Transverse rings of varying opacity are visible in the first  $1\frac{1}{2}$  mm. of the shell. The figure represents the earliest 2 mm. of the shell.

#### **Cadulus acuminatus, Tate.**

*Cadulus acuminatus*, Tate, Trans. Roy. Soc., S.A., 1887, vol. ix., p. 194. In 1904 vol. xxviii., p. 138, I discussed it fully.

Dredged since then in 26 fathoms 30 miles south-east of Newland Head, 2 alive; and in 28 fathoms close by, 6 alive; in 62 fathoms north-west of Cape Borda, 2; and in 90 fathoms off Cape Jaffa, 67 in good condition.

#### **Cadulus angustior, n. sp. Pl. xxvi., figs. 5, 5a, 5b.**

Shell thin, slightly curved, chiefly in the posterior half, cylindrical, very gradually increasing from behind, and very slightly narrowed at the front, scarcely compressed laterally.

Fractured at the posterior end at right angles to the curve, and with a small triangular spine, 1 mm. long, projecting backwards from the convex side. Anterior end open, sloping obliquely forwards from the convex side. Margins simple and smooth. Shell smooth, diaphanous.

*Dimensions*.—Length, 4·6 mm.; breadth, .6 mm.

There is a transverse milky line near the front; other specimens want this, and some may have one near the posterior end.

*Locality*.—Twenty-six fathoms 18 miles south-east of Newland Head, outside Backstairs Passage, type with several scores alive; 62 fathoms north-west Cape Borda, 8 good.

*Diagnosis*.—It differs from *C. acuminatus*, Tate, in being narrower and more cylindrical, with less bulging about the middle.

With these were found many specimens of two other forms—one like a very minute *Dentalium* of about the same length, much narrower at its posterior end, which is provided with a similar spine projecting from the convex side. The anterior end is fractured. The other form gradually increases to a diameter just about equal to that of the posterior end of the *Cadulus*, then contracts, and then expands again, and gradually attains the diameter of the middle of the *Cadulus*; here it is fractured. These appear to be three progressive stages of its growth—first, as a *Dentalium*-like shell, which becomes constricted when it reaches a certain age, then begins to form the proper *Cadulus* shell, from which it subsequently breaks off, leaving the tiny projecting spine beyond the line of fracture.

Type in Dr. Verco's collection.

#### *Cadulus spretus*, Tate and May.

*Cadulus spretus*, Tate and May, Trans. Roy. Soc., S.A., 1900, vol. xxiv., p. 102. Type locality—Port Esperance, Tasmania, in 24 fathoms (W. L. May); Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 420, pl. xxv., fig. 52; Hedley, Memoirs Austr. Mus., 1903, vol. iv., p. 328, in 41-75 fathoms off coast of New South Wales; also 5 fathoms in Dusky Sound, New Zealand; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 113, in 160 fathoms off Cape Pillar, Tasmania.

Dredged in 55 fathoms north-west of Cape Borda, 5 good; in 62 fathoms north-west of Cape Borda, 36 good; in 90 fathoms off Cape Jaffa, 6 good; in 110 fathoms off Beachport, 6 good; in 130 fathoms off Cape Jaffa, 18 good; in 150 fathoms off Beachport, 20 moderate; in 300 fathoms off Cape Jaffa, 1 poor. These are identical with cotypes sent to me by Mr. May.

At the following localities and depths a modified form was dredged:—Sixty-two fathoms north-west of Cape Borda, 3 good; in 90 fathoms off Cape Jaffa, 22 good; in 110 fathoms off Beachport, 3 good; in 130 fathoms off Cape Jaffa, 2 good; in 150 fathoms off Beachport, 5 good and 3 moderate. These have at one point in their length a sharp annular constriction, beyond which the shell often has a slightly altered axis, and at times a somewhat different curve. The relative length of the two portions varies; the earlier or the later part may form nearly the whole, or there may be any intermediate proportion. No complete *Cadulus* similar to *C. acuminatus*, Tate, was taken in these dredgings. Mr. May says that in the type locality, where several dozen cotypes were taken, no *C. acuminatus*, Tate, were obtained. Yet the constriction at the anterior end of *C. spretus* suggests that it is only the

initial half of a *Cadulus*, similar to *C. acuminatus*, and the presence of both portions of *C. angustior*, Verco, in its own locality heightens the probability; and these more or less fully formed individuals of *C. spretus* prove it.

***Cadulus (Polyschides) gibbosus*, n. sp. Pl. xxvi., fig. 6.**

Shell smooth, polished, narrow, somewhat fusiform, slightly compressed dorso-ventrally, smaller behind; greatest diameter at the junction of the middle and anterior third; dorsal surface obtusely angled at this point: ventral surface almost uniformly convex. Anterior end sloping forward from the convex to the concave surface, mouth rather wider than high. Posterior end with a slit on each side, one on the convex surface and a wider curve on the concave. Colour milky-white, least opaque in the middle third, most in the anterior and along the concave side of the shell. It is somewhat obliquely striatedly painted. At 1 mm. from the posterior end is a transverse colourless line.

*Dimensions*.—Length, 9·7 mm.; greatest diameter, 1·8 mm.; diameter of the posterior end, .45 mm.; of the anterior end, 1·1 mm.

*Locality*.—In 300 fathoms off Cape Jaffa, type with 3 others full grown, and 18 immature or fragments; in 130 fathoms off Cape Jaffa, 4 moderately good and 2 immature.

Type in Dr. Verco's collection.

***Turbo jourdani*, Kiener. Pl. xxvii., figs. 1 to 6a.**

In the Transactions of this Society, vol. xxxii., 1908, pp. 338 to 340, I gave some notes on this species, with a description of its operculum. I was unaware at the time that Dr. Cox had described the operculum in Proc. Linn. Soc., N.S.W., ser. ii., vol. iv., 1889, p. 189, from a specimen taken in Geographe Bay, Western Australia.

His shell was 14 cm. long by 12·5 cm. wide, and its operculum was 95 mm. by 80 mm. Since my Note I have received a beautiful example from Mr. Elliot, of *The Register* office, which was found with the fish in it on Wedge Island at the entrance to Spencer Gulf. This measures 21 cm. in length by 18·5 cm., in the greatest diameter of its body-whorl, so that it is just half as large again as Dr. Cox's specimen. But at Esperance Bay, in Western Australia, one was given to me measuring 22·3 cm. in length by 21 cm. in the greatest and 14 cm. in the smallest diameter of its bordy-whorl. It is a splendid great shell. Dr. Cox's specimen extends its *habitat* to Geographe Bay; but I took it at Rottnest Island, opposite Fremantle, and the lighthouse-keeper there (Mr.

Waters) has taken it alive. This carries it a little farther north. In September of this year Mr. Arnold, of St. Francis Island, sent me a specimen in spirit which was taken alive in Petrel Bay. This measures 11 cm. by  $9\frac{1}{2}$  cm., and has an operculum measuring 44 mm. by 39 mm., and 11 mm. in its thickest part. This thickest part is adjacent to the columella, and is white, while the part immediately over the depressed centre of the spiral and the narrower outer edge is of a cloudy-brown colour.

From the animal I was able to get the radula, which measured 40 mm. by 5 mm., and contained 76 rows of teeth. The formula is 39.5.1.5.39, or, as it might more exactly be written, (32.6.1) (1.4) .1. (4.1) (1.6.32). There is a central tooth (pl. xxvii., fig. 6), which has a flange on each side to overlap the adjacent edge of its neighbours. Each of these laterals overlaps the next tooth outside. The outermost lateral (fig. 4) has its upper border bent over and provided with a strong cusp at its inner end. This gives it a different appearance from all its fellows, and when the whole series is seen this tooth stands out very prominently, as in pl. xxvii., fig. 4. There are three kinds of teeth in the marginals. The first six (fig. 2) have stout bases surmounted by a bold polished cusp, and they gradually diminish in size outwardly, as seen in fig. 2 *in situ* and in fig. 2a, when dissected out: the three inner ones overlap the outer at their bases, and otherwise lie in part behind them. The three outer have not this overlapping lamina. Then follow 32 (approximately, varying in different rows) slightly-curved, narrow flat acicicular teeth with obsoletely denticulated tops (fig. 1). But there is one tooth placed *immediately behind* the first and largest lateral, solitary, out of line with the rest, and when examined *in situ* appearing somewhat sickle shaped, as in pl. xxvii., fig. 3; but when separated resembling the others, as in fig. 3a. I have not seen any notice of this particular marginal tooth in the literature of the radula at my disposal; but I find it also in that of *Turbo Grunerii*.

### **Pseudamyela dermestoidea, Lamarck.**

*Buccinum dermestoideum*, Lamarck, 1822, Hist. Nat. Anim. S. Vert., vol. vii., p. 275.

*Pyrene lineolata*, Tryon, Verco, Trans. Roy. Soc., S.A., vol. xxxiv., 1910, p. 131.

*Pseudamyela dermestoidea* (Lam.), Pace, Proc. Mal. Soc., Lond., 1902, vol. v., pp. 255, 267. Here Pace creates a new genus, *Pseudamyela*, for this species, which he separates from *Columbella*, and of which he gives a large bibliography. At the time of its publication I separated my cabinet specimens from *Columbella* and put them in the new genus *Pseudamyela* among the

*Pisaniinae*, and so overlooked them when working up my *Columbellas* last year and wondered how I had so little material. Consequently I can add the following locality:—Port Elliot and Middleton beach, fairly common.

**Pseudamyla miltostoma**, Tenison-Woods.

*Columbella miltostoma*, n. sp., J. E. Tenison-Woods, Proc. Roy. Soc., Tas., 1877 (1876), pp. 134-5.

*Pseudamyla miltostoma* (Ten.-Wds., as *Columbella*), Pace, Proc. Mal. Soc., Lond., 1902, vol. v., pp. 268-9.

*Pyrene miltostoma*, Tenison-Woods, Verco, Trans. Roy. Soc., S.A., vol. xxxiv., 1910.

Dredged in Gulf St. Vincent, depth unrecorded, 18° moderate.

NOTES ON THE MARINE SHELLS OF WESTERN AUSTRALIA,  
WITH DESCRIPTIONS OF NEW SPECIES.

PART I.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 12, 1911.]

PLATE XXVI.

In December, 1910, and January, 1911, I visited Western Australia and collected shells from the shores at Esperance Bay, Hopetoun, and King George Sound on the south coast; and from Ellensbrook and Yallingup, south of Cape Naturaliste; from Bunbury, and the shores of Rottnest Island. I also dredged a little in Esperance Bay; had two casts with the bucket-dredge in 35 fathoms, a little west of Hopetoun, through the kindness of Captain Walden, of the S.S. "Ferret"; a good deal of dredging in 12 to 14 fathoms and 22 to 28 fathoms, and 35 fathoms in King George Sound; a good deal in Geographe Bay in 15 and in 22 fathoms; and several casts off Fremantle, in 6 fathoms and in 15 fathoms from the Government tug-boat "Penguin," through the kindness of Captain Winzor (the harbour master) and of Captain Airey (master of the "Penguin").

I propose, therefore, as I take up the different genera and deal with my more extensive South Australian material to identify and record also all known Western Australian forms gathered by me, and describe any new species found.

I may say that of more than 400 different species collected in the West the very large majority of them are identical with or closely resemble our "Adelaidean fauna," as Mr. Hedley has called it.

**Dentalium intercalatum, Gould.**

Dredged in 10 to 12 fathoms off Fremantle, 2 fragments, with valid narrow ribs and intercalated riblets, recalling the above species.

**Dentalium francisense, Verco, *antea*.**

Dredged in 35 fathoms off Hopetoun, 1 moderately good with an appendix: in Geographe Bay in 15 fathoms, 4 moderate: in 22 fathoms, 2 good and 6 moderate; off Fremantle in 6 fathoms, 1 good; and in 10 to 12 fathoms, 1 poor. Taken on Bunbury Beach, 4 rolled; and on Rottnest Island, 2 rolled.

**Dentalium hyperhemileuron**, n. sp. Pl. xxvi.,  
figs. 3 and 3a.

Shell long and narrow, very slightly curved, mostly at the hinder part, white when dead, translucent when fresh, and glistening, rather thin. There are 12 axial ribs, invalid, and narrow; no increase in number with age; becoming obsolete early, so as to leave the anterior two-thirds of shell smooth but for very fine accremental scratch lines. Intercostal spaces nearly flat, slightly concave. Anterior orifice round, margin thin and simple. Posterior end truncated, with a long narrow diaphanous appendix directed eccentrically dorsally. The growth lines on the appendix form a convexly bordered sinus on the ventral surface about as wide as deep, and a scarcely depressed margin on the dorsal surface.

*Dimensions*.—Length, 20·5 mm.; greatest width, 1·8 mm.; least width, .7 mm.; length of appendix, 2·2 mm.; diameter, .4 mm.

*Locality*.—King George Sound, Western Australia, in 12-14 fathoms, 200, several alive; in 22-28 fathoms, 60, several alive; in 35 fathoms, 4 dead but good; Geographe Bay in 15 fathoms, 6 dead but good; in 22 fathoms, 4 dead; off Fremantle in 10-12 fathoms, 20 poor.

Some individuals with perfect posterior ends run down to a diameter of .3 mm., and are there diaphanous and ribless, and have only growth striae. Others more mature and with a posterior end of 1 mm. in diameter, and without an appendix, are here bevelled internally and thinner on the convex side, where there is a shallow triangular notch. The largest example is 30·75 mm. long by 2·3 mm. wide. The ribs may vary in number from 10 to 16 in different individuals.

*Diagnosis*.—It very closely resembles *D. hemileuron*, Verco, in the ribless anterior portion and the never-increasing ribs of the posterior end, and in their extension to within 2 mm. of the end in very young individuals and in the ventral notch at the hinder extremity; but the latter has no appendix, and the ribs are more valid and do not so soon become obsolete, and it is not found in such shallow water. But I think probably the absence of the appendix may be only an accidental circumstance, and the shallower water in which the Western Australian species lives may account for the other differences, and that this is only a local variety.

One individual, dredged in Geographe Bay at a depth of 15 fathoms, measures 4 mm. in length by .5 mm. in diameter at the anterior end. It has the apical end complete. The first portion of this, measuring 1·9 mm., has been

figured, and shows an initial elliptical section '35 mm. in length by '22 mm. in greatest width, and having a round hole in its end of about '15 mm. in diameter with a simple border; a second curved cylindrical section of '36 mm. long by '20 wide; a third slightly conical section of '60 mm. long by '35 mm. wide in its greatest diameter; and a fourth section of '65 mm. long by '40 mm. wide. The second section has its walls slightly corrugated, so as to give them a faintly undulating outline, with broad shaded transverse bands, which are visible also in the anterior half of the first section. The third segment is smooth but for very fine accremental transverse scratches. The fourth shows the commencement of the axial ribs, which gradually enlarge with the growth of the shell.

As this example so beautifully reveals the beginning of a *Dentalium* I have had it figured.

Type in Dr. Verco's collection.

***Dentalium lubricatum*, Sowerby.**

Dredged off Hopetoun in 35 fathoms, 5 good, dead.

***Cadulus occiduus*, n. sp. Pl. xxvi., fig. 7.**

Shell rather solid; ventral curve nearly uniformly slightly convex, more at the posterior part; dorsal side nearly straight in the anterior fourth, slightly convex in the next quarter, and slightly concave in the hinder half. It is cut off perpendicularly to the axis behind, rather obliquely in front, where the slope is backward toward the convex side. There is a slight dorso-ventral compression of the tube, so that both the apertures are slightly flattened, especially on the convex side. Surface smooth but for scanty transverse microscopic scratches. Colour white, more opaque anteriorly, and in transverse lines.

*Dimensions*.—Length, 9'6 mm.; anterior diameter, 1 mm.; posterior, '5 mm.; greatest diameter, 1'4 mm.

*Locality*.—Geographe Bay, off Bunbury, in 15 fathoms, type with 7 others; off Fremantle in 10 to 12 fathoms, very many.

Among the many specimens taken considerable variety obtains. Some full grown may measure only 5 mm. in length and be proportionally narrow, and the inflation on the concave side may be less in all degrees, almost to disappearance.

***Cadulus angustior*, Verco, *antea*.**

Dredged in 35 fathoms off Hopetoun, 3 good; in King George Sound in 12-14 fathoms, 40 good; in Geographe Bay in 15 fathoms, 30 good.

## EXPLANATION OF PLATES.

## PLATE XXVI.

1. *Dentalium francisense*, Verco, n. sp.  
 1a. " " " young.  
 2. " *hemileuron*, Verco, n. sp.  
 3. " *hyperhemileuron*, Verco, n. sp.  
 3a. " *lubricatum*, Sowerby, early stage.  
 4. " *lubricatum*, Sowerby, early stage.  
 4a. " apex.  
 5. *Cadulus angustior*, Verco, n. sp.  
 5a. " " initial stage.  
 5b. " " medium stage.  
 6. " *gibbosus*, Verco, n. sp.  
 7. " *occiduus*, Verco, n. sp.

## PLATE XXVII.

- 1 to 6. *Turbo jourdani*, Kiener, half of one row from the radula.  
 1, 2, 3. " " " marginal teeth.  
 4, 5. " " " lateral teeth.  
 6. " " " central tooth.  
 1a. " " " outermost marginals.  
 2a. " " " inner marginals.  
 3a. " " " innermost maginal.  
 4a. " " " outermost lateral.  
 5a. " " " other laterals.  
 6a. " " " central.  
 7. *Dentalium zelandicum*, Sowerby, one row from the radula.

ABSTRACT OF PROCEEDINGS  
OF THE  
**Royal Society of South Australia**  
(Incorporated)  
FOR 1910-11.

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ORDINARY MEETING, NOVEMBER 1, 1910.

Mr. MAYO in the chair.

ELECTION.—Professor Bragg was elected an Honorary Fellow of the Society.

Mr. ASHBY drew attention to the recent destruction of kangaroos on Kangaroo Island and moved that a deputation of members of the Society wait on the Commissioner of Crown Lands in connection with the matter. Resolved "That the President, Secretary, Mr. Ashby, and Mr. Howchin form the deputation, with power to add to their number."

EXHIBITS.—Mr. ASHBY exhibited birds from the Dandenong Ranges, Victoria; Mr. TEPPER, insects; and Dr. PULLEINE, trapdoor spiders from Burnett River, Queensland.

PAPERS.—"On Tetrahedrite from Glen Osmond Quarry," "Further Notes on Radio-Active Minerals from Olary," "On Obsidianites," and "Mineralogical Notes on Sphene, Pegmatite, Cordierite, Sillimanite, Beryl, and Semi-artificial Gypsum Twin Crystals from a Steam-boiler at Block 14 Mine, Broken Hill, New South Wales," by DOUGLAS MAWSON, D.Sc.

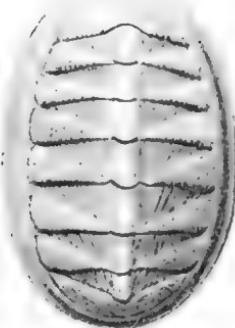
ORDINARY MEETING, APRIL 4, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

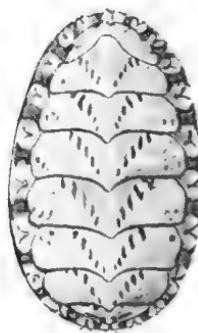
EXHIBITS.—Mr. E. V. CLARK, B.Sc., exhibited silicified wood from Scone, New South Wales, where it is abundantly scattered about the country. In the opinion of several Fellows the wood belonged to a species of pine allied to Araucaria, as the structure of the wood and annual rings were easily recognizable. Mr. CLARK also exhibited native sulphur from Mount Wingen, near Scone, where a gradually moving area of subterranean combustion is seen on the hillside, probably caused by combustion of the deposits of pyrites. Mr. HOWCHIN described the spontaneous combustion of pyrites which took place in the waste coal heaps in England. Dr. E. A. JOHNSON exhibited specimens of *Trichina spiralis* in muscle.

Nov-1910-11

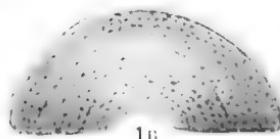
Vol. XXXV., Plate XXIV.



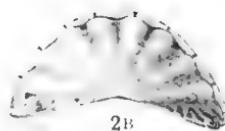
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2A



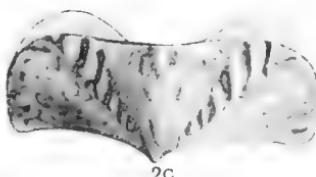
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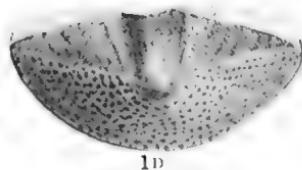
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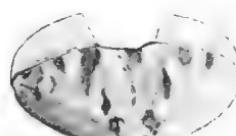
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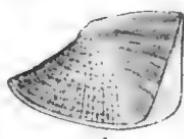
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1D



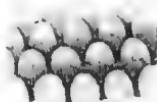
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1E



2E



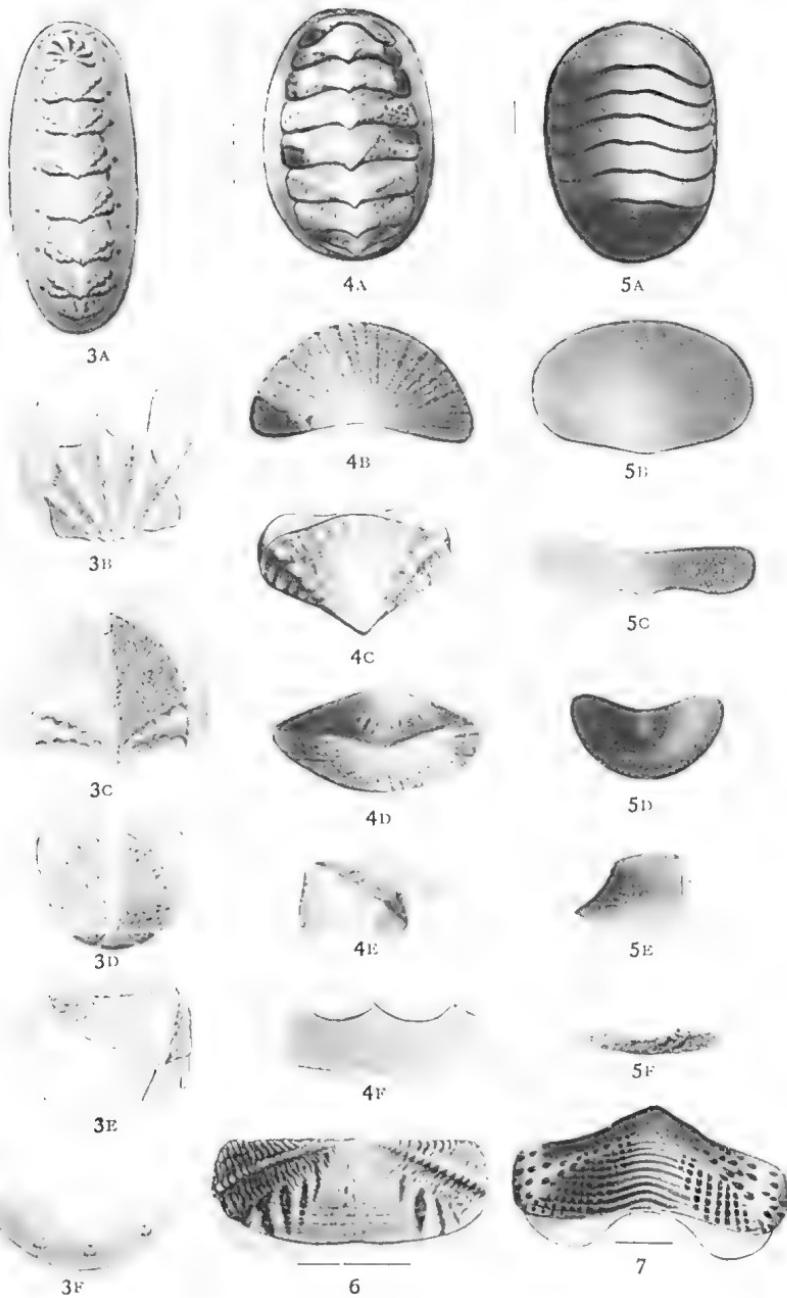
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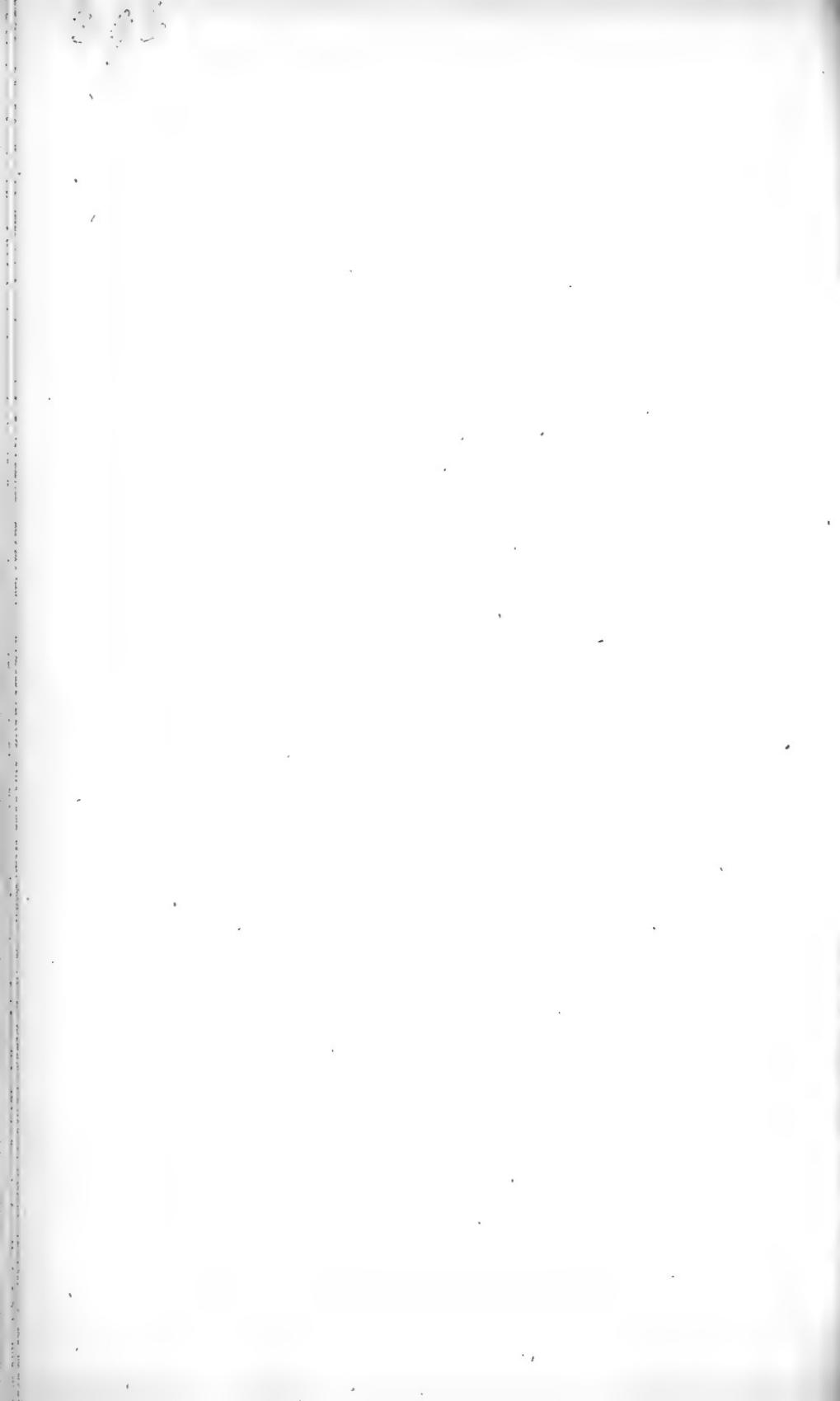


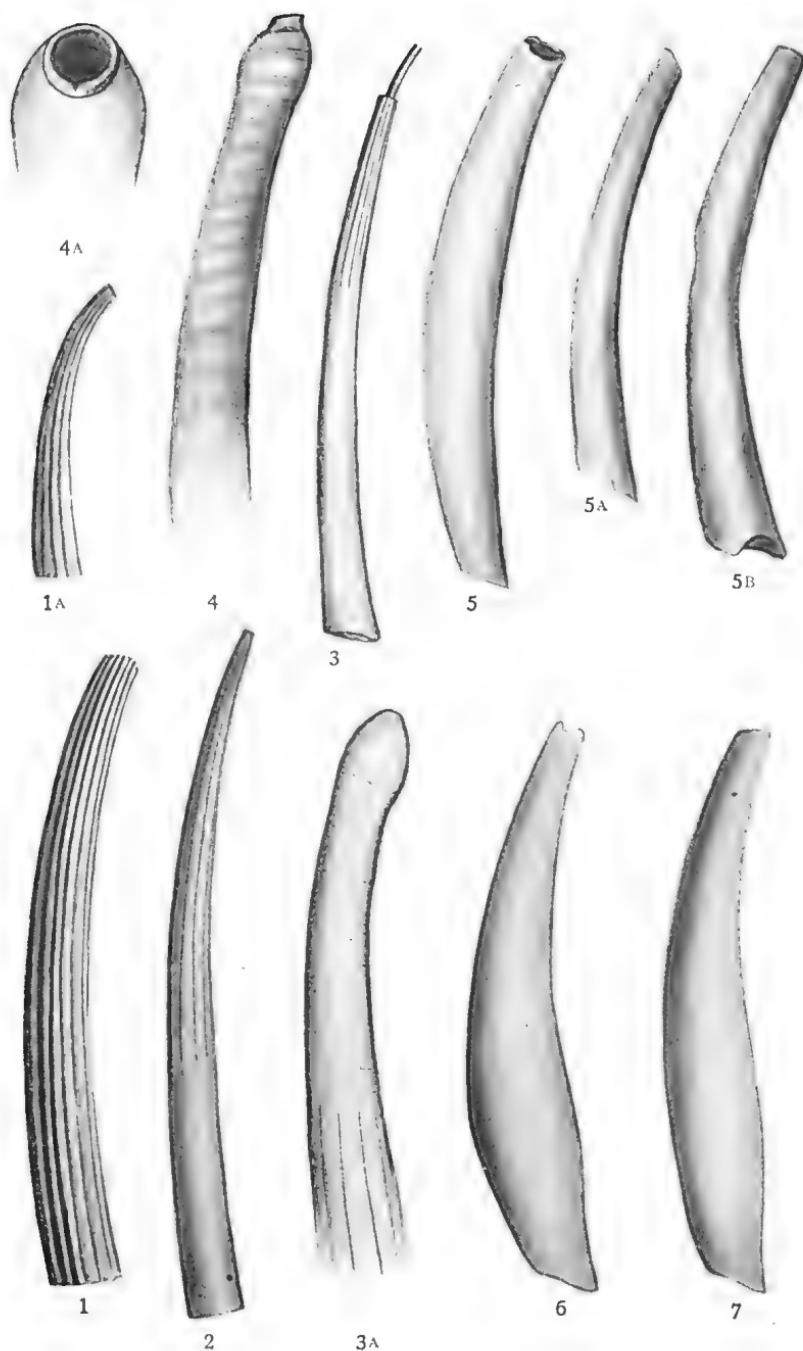
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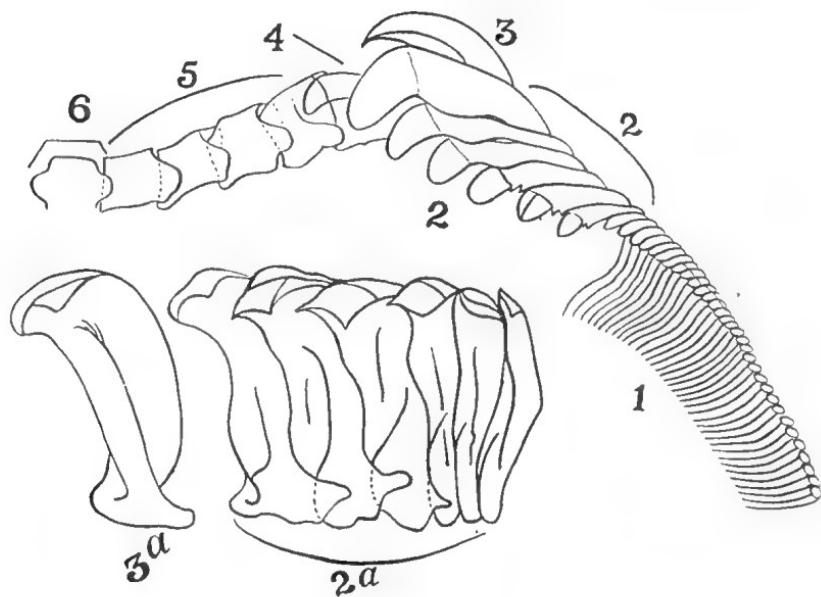
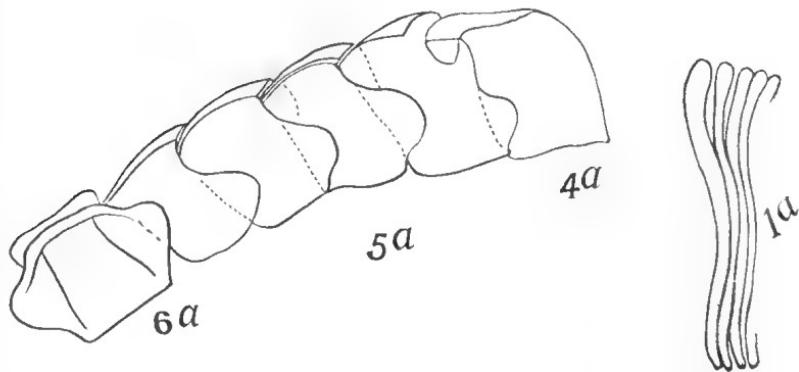
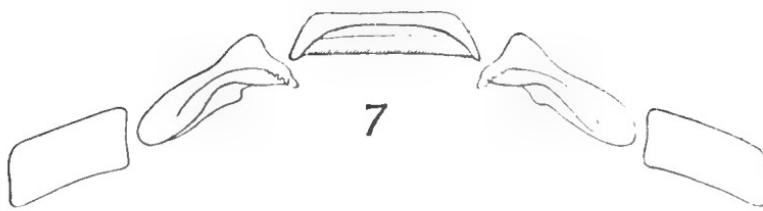
Egerton





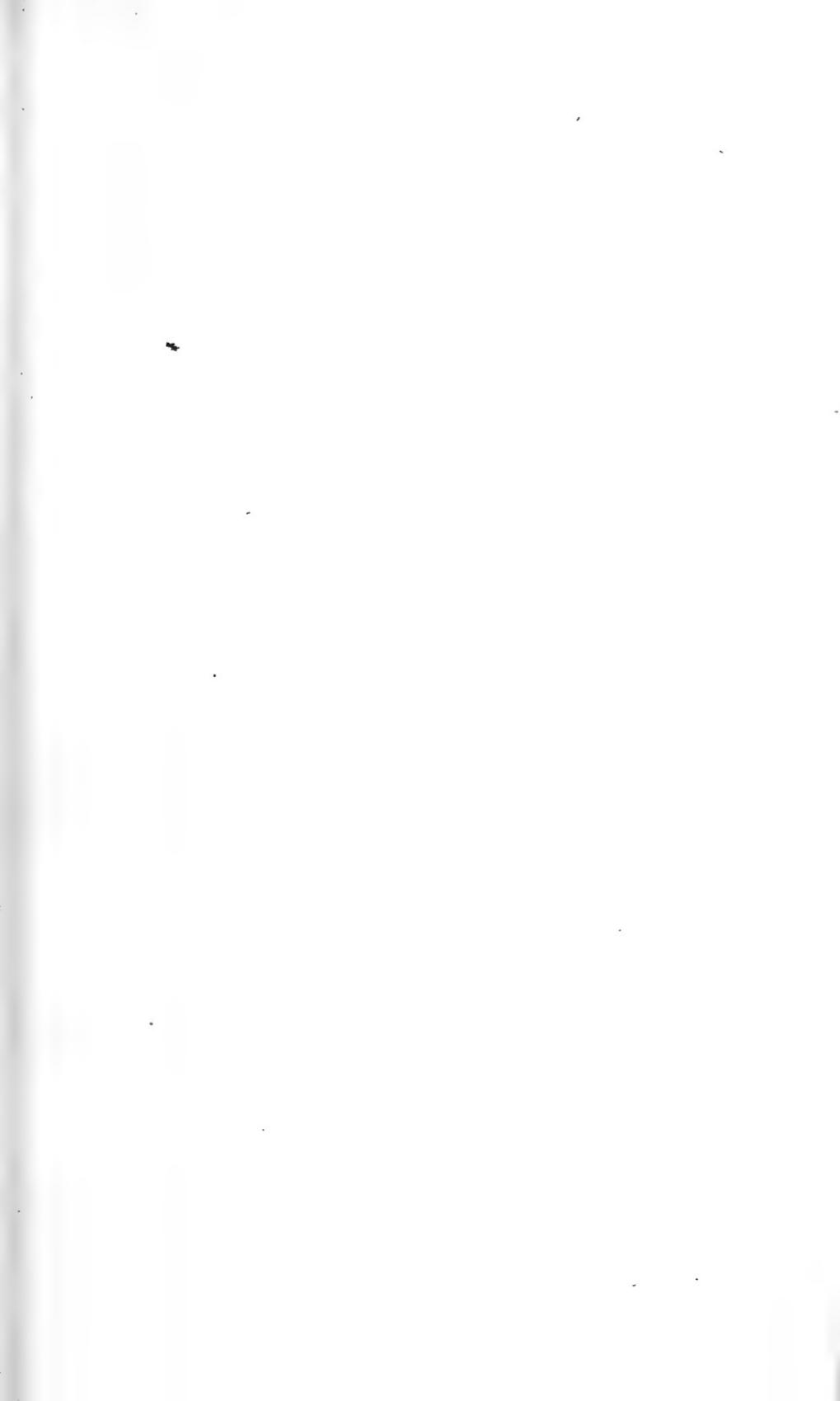


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## SOUTH AUSTRALIAN POLYPLACOPHORA.

By WILLIAM G. TORR, M.A., B.C.L. (Oxon.), LL.D.  
(Dublin and Adelaide).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvi., 1912.]

[Read September 12, 1912.]

## PLATES V. TO VII.

I have been invited by the President of the Royal Society of South Australia, Dr. J. C. Verco, to write a paper on the Polyplacophora, or multivalve-molluscs, of South Australia.

Since the publication of Mr. W. T. Bednall's paper on "South Australian Polyplacophora" in the Proceedings of the Malacological Society of London, vol. ii., part 4, April, 1897, a great impetus has been given to this interesting study in South Australia, and numbers of collectors have been at work, the following having written papers on the subject:—

W. G. Torr and Edwin Ashby, Trans. Roy. Soc., S.A., 1898; Edwin Ashby, Trans. Roy. Soc., S.A., 1900; M. M. Maughan, Trans. Roy. Soc., S.A., 1900; W. T. Bednall and E. H. Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906; Tom Iredale, Proc. Mal. Soc., London, June, 1910, and September, 1910.

To these writers I make my acknowledgments, as well as to the publishers of Tryon's *Man. Conch.*, vols. xiv. and xv.; E. R. Sykes, on Victorian Polyplacophora, Proc. Mal. Soc., London, vol. iii., part 2, July, 1896; A. F. Basset Hull, *Australian Naturalist*, April, 1908; W. G. Torr, *Western Australian Polyplacophora*, Trans. Roy. Soc., S.A., vol. xxxv., 1911; Torr and May, Proc. Royal Society of Tasmania, 1912; Henry Suter, *New Zealand Polyplacophora*. *Journ. Mal.*, 1905, vol. xii., part 4; C. Hedley and A. F. Basset Hull, *Records Australian Museum*, vol. vii., No. 4, 1909; and Prof. J. Thiele (Berlin), *Die Fauna Südwest-Australiens*, Band iii., Lieferung ii., 1911.

There are other numerous references to Polyplacophora in various papers which I have examined:—

G. F. Angas' list, Proc. Zool. Soc., London, January, 1865, consisted of fourteen species; of these four have been omitted as uncertain.

D. J. Adecock's list, published in 1893, contained eighteen species, of which eight have not been identified.

Mr. Bednall, in the Proc. Mal. Soc., London, 1897, published thirty-seven species, of which one has been omitted.

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Messrs. Maughan, Torr and Ashby, and Bednall and Matthews have brought up the list to fifty-two species, and this paper will raise the number to sixty-one identified species. Some of the names have had to be changed owing to Dr. Thiele and Mr. Tom Iredale's observations of the original specimens of Blainville and others.

My collection of chitons extends over practically the whole of the South Australian coastline from Port MacDonnell to Nuyt Archipelago in the Australian Bight.

The South Australian Polyplacophora include the following families:—*Lepidopleuridae*, Pilsbry; *Ischnochitonidae*, Pilsbry; *Mopaliidae*, Pilsbry; *Acanthochitidae*, Pilsbry; *Cryptoplacidæ*, Dall; and *Chitonidae*, Pilsbry.

The order of exposure of South Australian Polyplacophora, *mutatis mutandis*, is *P. albida*, Blainville, on exposed rocks at or near high-water mark, sometimes accompanied by *P. costata*, Blainville, with *P. matthewsi*, Iredale, under rocks in deeper water. *I. crispus* is in abundance almost everywhere a foot or two below high-water mark, sometimes accompanied by *I. thomasi* or *I. vergatus*. The *Acanthochites* are found in sheltered pools on sandy weed-covered rocks. In deeper pools *I. contractus*, *I. cariosus*, *I. ustulatus*, *I. sulcatus*, and other *Ischnochitonidae* are found, and deeper still *I. smaragdinus*, *I. ptychius*, *Lorica volvax*, *Loricella angasi*, *I. pilsbryi*, and most of the true chitons, *jugosus*, *tricostalis*, *exoptandus*, *calliozona*, and *torrianus*. On the west side of St. Vincent Gulf I have found true chitons on exposed rocks in shallow pools at low water. *I. tateanus*, *C. verconis*, *A. verconis*, and *C. bednalli* are, as a rule, obtained only by dredging.

Fam. LEPIDOPLEURIDÆ, Pilsbry.  
*Ischnochiton liratus*  
I. *Lepidopleurus inquinatus*, Reeve, 1847.

F 458

*Chiton inquinatus*, Reeve, Conch. Icon., sp. 154.

*Ischnochiton inquinatus*, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 90.

*Lepidopleurus liratus*, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192; Angas, loc. cit., 1865, p. 187; Pilsbry, Man. Conch., ser. i., vol. xv., p. 101.

*L. inquinatus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 141; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 86.

Specimens of this diminutive chiton have been found all along the coast of South Australia extending from Port MacDonnell to St. Francis Island, Nuyt Archipelago. The writer has specimens from Corney Point, Wool Bay, Marino,

Noarlunga, Robe, Cape Jaffa, Minlacowie, and St. Francis Island. Large specimens, 20 mm. long and 8 mm. broad, have been dredged in St. Vincent Gulf by Dr. Verco.

### *Terenochiton*

2. *Lepidopleurus matthewsianus*, Bednall, 1906. *F 35*

*Lepidopleurus matthewsianus*, Bednall, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

Specimens have been obtained from Port MacDonnell, Encounter Bay, Normanville, Noarlunga, Marino, Wool Bay, Corney Point, Hardwicke Bay, and St. Francis Island. I have also taken it at Burnie and Devonport, on the northwest coast of Tasmania. The sanguineous appearance of the foot of this animal is peculiar.

Fam. ISCHNOCHITONIDÆ, Pilsbry.

*Pteropeltis crocina*  
3. *Callochiton platessa*, Gould, 1846. *F 551*

*Callochiton platessa* (Gould): Haddon, "Challenger" Report, p. 15; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 141; Proc. Acad. Nat. Sci., Philad., 1894, p. 71; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 86.

*Chiton platessa*, Gould, Proc. Boston Soc. Nat. Hist., vol. ii., 1846, p. 143; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 49; Gould, U.S. Explor. Exped., p. 320, atlas, figs. 434, 434a.

*Lepidopleurus platessa*, Gould, Otia (Rectifications), 1862, p. 242.

*Chiton crocinus*, Reeve, Conch. Icon., pl. xxii., fig. 146, 1847.

*Callochiton crocinus*, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 50; vol. xv., p. 67.

*Leptochiton versicolor*, A. Adams, Proc. Zool. Soc., 1852, p. 92, May, 1854; Angas, Proc. Zool. Soc., 1867, p. 223.

*Lepidopleurus empleurus*, Hutton, Trans. N.Z. Inst., vol. iv., p. 178; Man. N.Z. Moll., p. 113, 1880; Pilsbry, Man. Conch., ser. i., vol. xv., p. 67.

Common in New South Wales, but rare in South Australia. Specimens have been obtained from Cape Jaffa, Second Valley, Aldinga, Marino, Corney Point, and valves have been dredged in Spencer Gulf. A very fine specimen, measuring 24 × 13 mm., was found by Mr. F. L. Saunders at Marino.

4. *Callochiton rufus*, Ashby, 1910.

*Callochiton rufus*, Ashby, Trans. Roy. Soc., S.A., 1900, p. 87; Die Fauna Südwest-Australien, Thiele, Band. iii., Lieferung ii., 1911.

One specimen only of this beautiful chiton was dredged by Dr. Verco in St. Vincent Gulf. It has been found by Dr. Thiele in Shark Bay, Western Australia.

5. *Ischnochiton* (*Stenochiton*) *juloides*, Adams and Angas, 1865.

*Stenochiton juloides*, Adams and Angas, Proc. Zool. Soc., 1864, p. 193; *op. cit.*, 1865; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 55.

*Ischnochiton* (*Stenochiton*) *juloides*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 142; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

Hab.—Holdfast Bay (Angas), Largs Bay (Adcock), Yorke Peninsula (Matthews).

I have specimens (whole or valves) from St. Francis Island (dredging and shore), Port MacDonnell, Carrowa (West Coast), Hardwicke Bay, Spencer Gulf (dredging), Kangaroo Island, Troubridge Reef, Glenelg, Brighton, Largs Bay, and Fowler Bay. Valves are frequently found in shell sand. Mr. A. R. Riddle informs me that he has found them on *Pinna inermis*, old boots and bottles, and especially near the roots of *Zostera* at an extremely low tide, by dredging or with a grapping-iron. They are rarely found in shallow water.

6. *Ischnochiton* (*Stenochiton*) *pilsbryanus*, Bednall, 1896. F 501

*Ischnochiton* (*Stenochiton*) *pilsbryanus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 142.

Type specimens found on seaweed, Troubridge Shoal, St. Vincent Gulf.

I have specimens from Tapley Shoal living in *Zostera* (seaweed), dredged specimens from Spencer Gulf and off St. Francis Island, live specimens and numerous valves in from 6 to 20 fathoms of water. Two large specimens were found by Mr. F. L. Saunders on seaweed at Aldinga; they measured  $9\frac{1}{2} \times 3$  mm. A number of very fine variegated specimens of this chiton have been found near the roots of *Zostera* at Wool Bay and other places by Mr. A. R. Riddle. The largest specimen measures  $17 \times 5$  mm.

7. *Ischnochiton* (*Stenochiton*) *pallens*, Ashby, 1900.

*Ischnochiton* (*Stenochiton*) *pallens*, Ashby, Trans. Roy. Soc. S.A., 1900. F 504

Dredged in St. Vincent Gulf by Dr. Verco. I found one specimen in shell sand at Aldinga, and Mr. Zietz collected a pretty buff specimen from Largs Bay. This species differs from *I. pilsbryanus* in the rapid tapering of the tail valves. As I have not had access to the type specimens of either *pilsbryanus* or *pallens*, it may be that my specimens may have to be reconsidered.

8. **Ischnochiton (Heterozona) cariosus**, Carpenter, MS.: *F484*  
Pilsbry, 1873.

*Heterozona cariosa*, Carpenter, MS.: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 65; vol. xv., p. 82.

*Ischnochiton (Heterozona) cariosus*, Pilsbry: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 143; Sykes, Proc. Mal. Soc., London, vol. iii., part 2, July, 1896, p. 87.

This shell is widely distributed. It is abundant in Spencer and St. Vincent Gulfs, and the writer has collected it on St. Francis Island and all around the coast of Western Australia as far as Fremantle. It is often covered with *Serpularia* and has a *carious* appearance, hence its name.

9. **Ischnochiton pilsbryi**, Bednall, 1897 *F475-6*

*Ischnochiton pilsbryi*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 143.

Found at Sultana Bay (Bednall) and at Hickey Point, Y.P., and St. Francis Island by the writer. Most of the specimens were found on rocks embedded in the sand. At first sight it might be mistaken for *crispus* or *cariosus*, but markings and girdle scales are very distinct, and all the specimens are "uniform ochraceous-yellow."

10. **Ischnochiton <sup>torii</sup> ustulatus**, Reeve, 1847: *F484*.

*Chiton ustulatus*, Reeve, Conch. Icon., sp. 102; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 96.

*Ischnochiton ustulatus*, Carpenter, MS.: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 88.

*Lepidopleurus ustulatus*, Angas, P.Z.S., 1867, p. 222.

When alive this shell is very brilliant, almost crimson; but it loses its colour in formalin, methylated spirits, or when dry, and retains its singed appearance from which it derives its name. The writer has traced it all around the coast from Cape Jaffa to St. Francis Island. He also found it in Western Australia. An abnormal specimen was found by Mr. F. L. Saunders at Second Valley. It is much broader than the usual types; it measures 37 x 18 mm.

This chiton easily changes its habitat. Scores of specimens seen by Mr. Matthews on Yorke Peninsula one week were not able to be discovered the week following.

11. **Ischnochiton <sup>elongatus</sup> crispus**, Reeve, 1847 *F481*

*Chiton crispus*, Reeve, Conch. Icon., sp. 120; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

*Ischnochiton haddoni*, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 88.

*Ischnochiton crispus*, Reeve: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

*Chiton longicymba*, Blainville: Sowerby, Conch. Illus., fig. 67; Reeve, Conch. Icon., pl. xxiv., fig. 163 (*non* Blainville).

*Ischnochiton longicymba*, Blainville: Hutton, "Challenger" Report, p. 17 (*non* Blainville).

This very variable shell is found abundantly on the coasts of New South Wales, Victoria, Tasmania, and South Australia. The writer has specimens from almost every part of the South Australian coast from Port MacDonnell to St. Francis Island in the Australian Bight. It is not found in Western Australia. I collected a five-valved specimen at Ulverstone, Tasmania.

No chiton varies so much in colouration as *I. crispus*. I have pale emerald-green, black with a white stripe on the dorsal area, and white with a black stripe, brown and yellow. The commonest kind is a pale-yellow ochre colour. A very beautiful species has been called var. *decoratus*. It has a milky-white ground with regular green or brown longitudinal markings continued throughout the valves. The description given by Pilsbry, *loc. cit.*, of *I. haddoni* agrees with the shell better than any other I have seen.

### 12. *Ischnochiton fruticosus*, Gould, 1846.

*Chiton fruticosus*, Gould, Proc. Boston Soc. Nat. Hist., ii., p. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 91; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145.

*Ischnochiton fruticosus*, Gould: Pilsbry, Proc. Acad. Nat. Soc., Philad., 1894, p. 72.

This common New South Wales species is very rare in South Australian waters. The writer has examined hundreds of specimens similar to *fruticosus* and has only found one in South Australia with the striations on the girdle scales. One specimen only was found by Mr. E. H. Matthews on Southern Yorke Peninsula.

### 13. *Ischnochiton contractus*, Reeve, 1847.

*Chiton contractus*, Reeve, Conch. Icon., sp. 78; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

*Ischnochiton contractus*, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93; Nautilus, vol. viii., p. 129; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145.

*Chiton pallidus*, Reeve, Conch. Icon., sp. 92, March, 1847; Pilsbry, Man. Conch., ser. ix., vol. xiv., p. 89.

Other synonyms are given by Pilsbry which are evidently intended, according to Bednall and Iredale, for *I. decussatus*.

Many scores of specimens are in my cabinet from both Gulf St. Vincent and Spencer Gulf, also from Hopetoun and Albany, in Western Australia. I have dried specimens 46 mm. long and 22 mm. broad.

14. *Ischnochiton variegatus*, Adams and Angas, 1864. F 440

*Lepidopleurus variegatus*, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192; Pilsbry, Man. Conch., ser. i., vol. xv., p. 102. 441  
*Ischnochiton variegatus*, Bednall, Proc. Mal. Soc., London, 442 vol. ii., part 4, April, 1897, p. 146.

This species is found in Spencer and St. Vincent gulfs. It will probably be classed under *I. crispus*, which it closely resembles. Pilsbry has no plates of this variety in his Manual, and the description given would equally apply to *I. crispus*. Bednall says it attains a length of two-thirds of an inch. I have a number of specimens from the coasts of Yorke Peninsula, Port MacDonnell, Cape Jaffa, and Marino. It is probably a cream-coloured variety of *crispus*.

*contractus*

15. *Ischnochiton sulcatus*, Quoy and Gaimard, 1834. F 445

*Chiton sulcatus*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 385.

*C. decussatus*, Reeve, Conch. Icon., 1847, pl. xviii., fig. 107.

*C. castus*, Reeve, op. cit., pl. xxii., fig. 145.

*Lepidopleurus speciosus*, Adams and Angas, P.Z.S., 1864, p. 192; 1865, p. 187.

*Gymnoplax urvillei*, Rochebrune, Bull. Soc. Philom., Paris, 1880-1, p. 121.

*Ischnochiton sulcatus*, Quoy and Gaimard: Pilsbry, Man. Conch., 1893, ser. i., vol. xiv., p. 138; Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 91.

*I. decussatus*, Reeve: Bednall, Proc. Mal. Soc., London, 1897, vol. ii., p. 146.

The most beautiful of the South Australian *Ischnochitons* may be easily distinguished by being broader in proportion to its length than the majority of *Ischnochitons*. It favours the edges of rocks, and is often found on top of stones and on the razor-like bivalve, *Pinna inermis*. The colours are very various—blue-green, rich brown, cream with brown dorsal areas, ochreous-yellow with splashes of purple, straw-colour with dark-brown splashes, brown and green with cream-white dorsal areas, and uniformly cream. I have dried specimen, 46 mm. long and 27 mm. broad. Juveniles may be easily distinguished by the regular pustules in the anterior and posterior valves and the lateral areas of the median valves. They are common in Spencer and St. Vincent gulfs, Streaky Bay, and West Coast.

16. *Ischnochiton ptychius*, Pilsbry.

F448

*Ischnochiton ptychius*, Pilsbry: *Nautilus*, vol. viii., p. 53; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 147.

It is often placed among *crispus*, but as a rule is found in much deeper water. I have specimens from Robe, Cape Jaffa, Second Valley, Normanville, Marino, and Southern Yorke Peninsula. Good specimens were taken by Mr. A. R. Riddle on broken *Haliotidae* at Marion Reef, and also in a deep rock pool at Black Hill, near Port Moorowie. The strong serrations at the sutural margins of the valves, mentioned by Mr. Bednall, are plainly distinguishable in some specimens. In others they are missing, although taken at the same spot and similar in every other particular.

"It is a small oval pink-tinged shell, with wrinkled striations on the dorsal areas, and somewhat coarse concentric sulcations on the lateral areas, which are strongly serrated at the sutural margin."

It is somewhat difficult for a beginner to separate it from *I. crispus*.

*I. ptychius* has finely striated girdle scales.

17. *Ischnochiton tateanus*, Bednall, 1896.

F449

*Ischnochiton tateanus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 147; Sykes, Proc. Mal. Soc., London, vol. iii., part 2, July, 1896, p. 87.

It may be distinguished by its form. In well-preserved specimens the width is nearly two-thirds of the length, and the fine serrations on the posterior edge of the lateral areas of the median valve are distinctly seen in most of the specimens.

*I. tateanus* is rarely found near the shore. It is a deep-water species. Dr. Verco has dredged several in St. Vincent and Spencer gulfs, and valves have been taken at St. Francis Island in 19 fathoms of water. A beautiful specimen was taken by Mr. F. L. Saunders at Marino. It is a pale-chocolate on the dorsal area, throughout the valves, and the lateral and pleural areas of the second, sixth, and seventh valves are creamy-white.

17A. *Ischnochiton wilsoni*, Sykes, 1896.

F4489

*Ischnochiton wilsoni*, Sykes, Proc. Mal. Soc., vol. ii., part 2, July, 1896, p. 89.

One specimen dredged by Dr. Verco and one procured by Mr. Matthews are probably all that have been found in South Australian waters. The writer has one specimen 9 x 5 mm. from Marino (?). In this sample the granulations

in the pleural area are, under a  $\frac{1}{4}$ -in. lens, arrow-shaped, with the point towards the dorsal area.

Mr. Matthews has kindly sent me a very fine specimen, 24  $\times$  14 mm., which I take to be *I. wilsoni*. It has not the rosy-pink of the type, but the splashes of grey-brown and white correspond with Syke's drawing. The girdle scales are black, amber, and pearly-white, the rich brown splashes predominating. As far as I can decide with an undissected specimen, the anterior valve has nine and the posterior valve eight slits. The striations of the girdle scales are very distinct, four to seven striae on each scale.

#### 18. *Ischnochiton smaragdinus*, Angas, 1867. *F 1490*

*Lophyrus smaragdinus*, Angas, Proc. Zool. Soc., 1867, p. 115; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 137, vol. xv., pl. xv., fig. 27.

*Lepidopleurus smaragdinus*, Carpenter, MS.

*Ischnochiton smaragdinus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4., April, 1897, p. 148.

*I. (Haploplax) smaragdinus*, Angas: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 72.

The drawing of this shell in Pilsbry's Manual is very unsatisfactory. Both Angas' and Carpenter's descriptions seem incomplete. This shell may be distinguished by the blue-green spots on an olive-brown ground and the very pearly scales on the girdle. It is generally found in deeper water than the majority of *Ischnochitons*. It has the blue spots of *I. lentiginosus* of New South Wales, but it is not so carinated nor are the lateral areas so distinct as in *I. lentiginosus*. I have specimens from Yankalilla, Normanville, Second Valley, Aldinga, Marino, and elsewhere. It is exceedingly common on the north-west coast of Tasmania, where it is found in shallower water than in South Australia. I have considerable difficulty in separating this species from *Ischnochiton resplendens*, Bednall and Matthews, Proc. Mal. Soc., London, vol. ii., part 2, June, 1906.

#### 19. *Ischnochiton virgatus*, Reeve, 1848. *496*

*Chiton virgatus*, Reeve, Conch. Icon., sp. 192; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 78.

*Trachydermon virgatus*, Reeve: Carpenter, MS., p. 22.

*Ischnochiton virgatus*, Reeve: Carpenter, MS., p. 106; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 148.

This very pretty diminutive chiton, so ably described by Mr. Bednall, loc. cit., has been found all along the South Australian coast from Port MacDonnell to St. Francis Island. I have specimens from nineteen different places, in-

cluding Kangaroo Island. I also collected it at Albany, Western Australia. Some very dark specimens were collected at Streaky Bay, which seemed a variety if not a new species. Under a  $\frac{1}{4}$ -in. lens the girdle scales of *virgatus* are minutely striated. Carpenter says they are *not* striated. I have counted from ten to twelve striae.

**20. Ischnochiton thomasi**, Bednall, 1896.

*Ischnochiton thomasi*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

The polished mottled appearance and pearly girdle scales are the distinctive features of this chiton. There are several varieties. I have specimens from Robe, Cape Jaffa, Second Valley, Normanville, Aldinga, Marino, Minlacowie, Southern Yorke Peninsula, and Venus Bay. It thus traverses the greater part of the South Australian coastline.

**21. Ischnochiton resplendens**, Bednall and Matthews, 1906.

*Ischnochiton resplendens*, Bednall and Matthews, Proc. Mal. Soc., London, vol. viii., part 2, June, 1906. FH91

After careful examination of a number of specimens of this very beautiful *Ischnochiton* I can only place it as a colour variety of *I. smaragdinus*. While the appearance of some specimens varies considerably from *smaragdinus*, by putting a series, they run into one another, till it becomes practically impossible to separate them. I have *smaragdinus* 20 mm. long by 12 mm. broad, which is nearly as large as the type specimen of *resplendens*, and the colour-marking is hardly sufficient to make a new species. I have specimens from Port MacDonnell, Beachport, Cape Jaffa, Robe, Encounter Bay, Marino, Kangaroo Island, Minlacowie, Hardwicke Bay, and Corney Point. My specimens from Robe resemble Mr. Bednall's description. Specimens have also been taken in Wool Bay by Mr. A. R. Riddle.

**22. Ischnochiton ~~gryei~~ *variegatus***, Filhol, 1880.

*Tonicia gryei*, Filhol, Comptes Rendus, 1880, vol. xci. FH491-2-3  
p. 1095.

*Lepidopleurus melanterus*, Rochebrune, Bull. Soc. Philom., Paris, 1883-4, p. 37.

*Ischnochiton parkeri*, Suter, Proc. Mal. Soc., 1897, vol. ii., p. 186.

*I. fulvus*, Suter, Journ. Malac., 1905, vol. xii., part 4, p. 66; Iredale, Trans. N.Z. Inst., 1907 (1908), vol. xi., p. 373.

*I. gryei*, Filhol: Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 91.

Going through Mr. Suter's specimens in Auckland, New Zealand, the author remarked that he had seen specimens

of a red *crispus* in South Australia similar to what Suter called *I. fulvus*. On his return to South Australia some specimens were sent to Mr. Suter, some of which were identified with *I. fulvus*, others with *I. crispus*. Some very beautiful specimens of *I. gryei* were taken off Port MacDonnell jetty and Cape Jaffa. The identification will require future consideration. Mr. Sanders found several diminutive specimens at Second Valley, which I take to be *gryei*.

23. ***Ischnochiton* (*Ischnoradsia*) *novæ-hollandiæ***,<sup>F587</sup>  
Gray and Reeve, 1847.

*Chiton novæ-hollandiæ*, Gray, M.S.: Reeve, Conch. Icon., sp. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 145.

*C. (Lophyrus) australis*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877, p. 46 (non Pilsbry).

*Ischnochiton* (*Ischnoradsia*) *novæ-hollandiæ*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 150.

Strongly resembles *I. australis*, Sowerby, but the lateral areas of *australis* are much more deeply sulcated than those of *novæ-hollandiæ*, and the pleural areas of the former are longitudinally ribbed, although I have found some *novæ-hollandiæ* slightly ribbed in the pleural areas.

Some specimens in my collection labelled Marino, South Australia, are certainly *I. australis*, but further investigation must be made before placing it on the list of South Australian chitons.

*I. novæ-hollandiæ* favours the open ocean beaches. I have specimens from Encounter Bay, Tungkalilla (large numbers), Kangaroo Island, and Second Valley; also from Penguin, Stanley, Wynyside, and Devonport in Tasmania, and Beaumaris, New South Wales. One dried specimen is 65 mm. long and 35 mm. broad. *I. australis* is common in New South Wales. The Tasmanian species show longitudinal ripples in the pleural areas.

Subfam. CALLISTOPLACINÆ, Pilsbry.

24. ***Callistochiton antiquus***, Reeve, 1847 (?).<sup>F588</sup>

*Chiton antiquus*, Reeve, Conch. Icon., t. 25, f. 169 (poor).

*Lepidopleurus antiquus*, Angas, P.Z.S., 1867, p. 223.

*Callistochiton antiquus*, Carpenter, MS., and Haddon, "Challenger" Polyplac., p. 20.

*Chiton* (*Callistochiton*) *antiquus*, E. A. Smith, Zool. Coll. "Alert," p. 79.

*Callistochiton sarcophagus*, Carpenter, MS.

*C. antiquus*, Reeve: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 150; Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 73.

Very often found covered with calcareous matter. I have traced it from Port MacDonnell through both gulfs to St. Francis Island. Some beautiful dark-brown specimens came from Mr. Anderson, of Second Valley, and rich red (iron-stained ?) ones from Cape Jaffa. Its sculpture and rounded appearance easily differentiates it from other chitons. It is our only South Australian *Callistochiton*. "This genus differs from *Ischnochiton* in the peculiar insertion-teeth, which are curved into ribs as if festooned, in the relation of the slits to the external ribs, and in the tail valve, which is often peculiarly humped" (Pilsbry, Man. Conch., ser. i., vol. xiv., p. 260). This chiton has a very wide range, and has been collected by the author in places as far apart as Queensland and Western Australia.

Fam. CHITONIDIÆ, Pilsbry.

*Onithella*

25. *Onithochiton ashbyi*, Bednall and Matthews, 1906.

*Onithochiton ashbyi*, Bednall and Matthews, Proc. Mal. Soc., London, vol. viii., part 2, June, 1906, p. 92. F573

As far as I am aware, only one specimen of this chiton has been discovered. It was found by Mr. Ashby at Aldinga, and to him I am indebted for the specimen. It is our only *Onithochiton*, and the eyes are of a pearly appearance set in its cream-coloured valves. The smooth warty appearance will easily distinguish this shell.

*Onithochiton*

*Antiloc~~Chiton~~ tricostalis*, Pilsbry, 1894.

*Chiton (canaliculatus, var. ?) tricostalis*, Pilsbry: Nautilus, vol. viii., 1894, p. 54. F564

*C. tricostalis*, Pilsbry: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

This "handsomely sculptured shell" assumes an endless variety of colour. I have specimens, red and green, pink and black, green and white, creamy, cream with black spots, yellow with black spots, etc. The second valve is often of a distinctive colour. It is *bicostalis* in small specimens, the middle rib in the lateral areas begins when about half-grown. Some valves have four ribs. I have specimens from Capes Jaffa and Jervis, several places in Gulf St. Vincent, Southern Yorke Peninsula, and St. Francis Island. I have collected it in Western Australia, and have specimens from New South Wales.

*Antiloc~~Chiton~~ calliozona*<sup>45</sup>, Pilsbry, 1894.

*Chiton (Æreus, var.) calliozona*, Pilsbry: Nautilus, vol. viii., 1894, p. 55. F561

*C. calliozona*, Pilsbry: Bednall, Proc. Mal. Soc., London., vol. ii., part 4, April, 1897, p. 151.

This is the largest of our true chitons. I have one dried specimen measuring  $55 \times 25$  mm. Colour markings very variable; pinks, greens, and bronze-browns are wondrously intermingled, while the minute pearls of the girdle are like rubies, emeralds, etc. It is found on smooth stones in clean sandy pools among seaweed. I have samples from Second Valley, Normanville, Marino, Wool Bay, Hardwicke Bay, and St. Francis Island. Fine specimens were taken at Marion Reef from the shell of living *Pinna inermis* and from broken bottles by Mr. A. R. Riddle. It is very like *Chiton aereus*, Reeve, from New Zealand, but there are marked differences.

*AUTHO* 28.-**Chiton jugosus**, Gould, 1846. *richieally*  
*co* *Same as F560*

*Chiton jugosus*, Gould, Proc. Boston Soc. Nat. Hist., ii., 1846, p. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 178; Gould, Expl. Exped., xiii. Moll. and Sh., p. 317, atlas, t. 28, f. 430, 1852; Smith, Zool. Coll. "Alert," p. 78, 1884; Haddon, "Challenger" Polyplac., p. 22, 1886; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 151.

*C. concentricus*, Reeve, Conch. Icon., 1847, sp. 95.

*Lophyrus jugosus*, Gould, Otia, p. 3, 212, 1862; Angas, P.Z.S., London, 1867, p. 222.

*L. concentricus*, P.Z.S., 1867, p. 221. *F560*

Hedley and Hull's comparison of *C. jugosus*, *C. torri* (*torrianus*), and *C. coxi*, in Records Australian Museum, vol. vii., No. 4, 1909, p. 262, is very valuable. The New South Wales specimens are not, as a rule, as brightly coloured as those from South Australia. Some from Watson Bay, New South Wales, are pink and brown, others a creamy-white in the six median valves, and the whole shell is broader than those from South Australia. The South Australian specimens are uniform in colour, the pale-blue green markings in the sulcations of the pleural areas are very distinct. It is found in fairly deep water, and loves the ocean rocks. I have specimens from Port MacDonnell, Beachport, Robe, Middleton, Cape Jaffa, Cape Jervis, Second Valley, Normanville, Aldinga, Marino, Venus Bay, and St. Francis Island. It has also been found at Kangaroo Island and Corney Point. Specimens from the last place measure  $47 \times 25$  mm. Strange to say, I have no specimens from Spencer Gulf.

*AUTHO* 29.-**Chiton torrianus**, Hedley and Hull, 1909. *F558-9*

*Chiton coxi*, Pilsbry: Bednall, Proc. Mal. Soc., London, vol. iii., part 4, April, 1897, p. 151.

*C. torri*, Hedley and Hull, Records of the Australian Museum, Sydney, vol. vii., No. 4, 1909, p. 262.

*C. hullianus*, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 103.

*C. torrianus*, Hedley and Hull, Mal. Soc. Journ., March, 1911, vol. ix., part 4.

Specimens of this very beautiful chiton were misnamed *C. coxi* for some years till the comparison of *C. jugosus*, *C. torrianus*, and *C. coxi*, by Hedley and Hull, *loc. cit.* The concentric lines on all valves differentiate it from *C. coxi*, and the sulcations of the pleural areas make it impossible to put it with *C. jugosus*. It is rarely found in the gulfs. I have collected it from Cape Jervis, Kangaroo Island, and Corney Point. Large numbers were found at the latter place by Mr. Walter Klem. Mr. Bednall reports it from Sultana Bay. I have South Australian specimens measuring  $42 \times 25$  mm. and Western Australian  $52 \times 29$  mm. I have collected it all around the coast of Western Australia from Esperance to Fremantle.

30. *Neucosquama nielseni*

*Chiton limans*, Sykes, 1896. F566

*Chiton muricatus*, A. Adams, Proc. Zool. Soc., 1852 [May, 1854], p. 91, pl. xiii., fig. 6; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 175, pl. xxxvii., figs. 12, 13; *non* Telesius, Mem. Acad. Sci., St. Petersb., ser. v., vol. ix., 1824, p. 483.

*Lophyrus muricatus*, Angas, Proc. Zool. Soc., 1865, p. 186, *loc. cit.*, 1867, p. 222.

*Chiton limans* and *C. carnosus*, Carpenter, MS.: Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 93.

The pointed girdle scales differentiate this rare South Australian chiton from all others of the family in South Australian waters. I have only one specimen from Dr. Verco, labelled Hardwicke Bay, Spencer Gulf. Its colour is a pale-ochreous yellow with light- and dark-brown on the first, second, fourth, fifth, and anterior valve. The markings and girdle scales correspond with specimens of *C. muricatus* from New South Wales.

AUTHO 31.—*Chiton exoptandus*, Bednall, 1896.

*Chiton exoptandus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 152.

This "much desired" chiton is easily distinguished from others by the uniformity of its pinkish colour-marking so well described by Mr. Bednall, *loc. cit.* It runs through all the gradations of a pinkish-yellow to a burnt sienna. One specimen in my possession has a uniform rich reddish brown strip the full length of the dorsal areas of each valve. I have specimens from Second Valley and valves from Normanville. It is frequently found at Marino, Troubridge, and Edithburgh, and is very plentiful at low tides in Wool Bay. I collected one small specimen in the crevice of a rock at Min-

F563

lacowie and a valve at Corney Point. It has been dredged by Dr. Verco, and seems to confine itself to Spencer and St. Vincent gulfs. My specimens are not the largest found, although I have them  $45 \times 25$  mm.

**ANTHO 32.—*Chiton bednalli*, Pilsbry, 1895. F562**

*Chiton bednalli*, Pilsbry: *Nautilus*, ix., 1895, p. 90; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

This, the most beautiful of all South Australian *Chitonidae*, may be only a colour variety of *exoptandus*, but the uniformity of its green colouring differs so much from the pinkish tinges of *c. optandus* that it may well be classified and named after the *doyen* of *Polyplacophora* writers in South Australia. I have a specimen from Sultana Bay, a valve from St. Francis Island, a valve dredged from 25 fathoms in Thorny Passage, and several specimens dredged by Dr. Verco in Gulf St. Vincent. Size,  $40 \times 20$  mm. One specimen was found by Mr. Kimber at Aldinga (South Australia), and Mr. Sykes reports it from Port Philip.

*Mucrosguana*

**33. *Chiton verconis*, Torr and Ashby, 1898 F569-8**

*Chiton verconis*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 215.

This chiton strongly resembles the drawings of *Chiton huttoni*, Suter, Trans. N.Z. Inst., vol. xxxviii., 1905, p. 321, pl. xviii., figs. 1-6; but the slope of the tail valve is much steeper in *C. verconis*, and the pointed girdle scales are decidedly different. These scales are very similar to *C. limans*, but in the latter there are no striations. *C. verconis* has been dredged by Dr. Verco in Yankalilla Bay, 9 fathoms; Rapid Head, 9 to 11 fathoms: and in Spencer Gulf. All my specimens have been dredged. Mr. W. D. Reed has dredged it in Spencer Gulf, and it has been taken at Aldinga by Mr. Kimber. I have a very fine specimen labelled Port Fairy (Victoria), from the late Mr. Adecock's collection.

**ANTHO 34.—*Chiton oruktus*, Maughan, 1900. F557**

*Chiton oruktus*, Maughan, Trans. Roy. Soc., S.A., 1900, p. 89.

This shell has been found only on the south-east coast of South Australia. One specimen comes from Cape Jaffa and several have been taken at Port MacDonnell. It ought to be in Victorian waters. Mr. Maughan's description is very helpful, but the plates are very indistinct.

35. **Chiton aureo-maculata**, Bednall and Matthews, 1906.

*Chiton aureo-maculata*, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906, p. 91. F564

The type specimen was reported from Marion Reef, Troubridge Island. Mr. Gatliffe sent me one from Victoria, which at the time I was unable to identify. The Rev. S. J. Martin took a fine specimen at Minlacowie. I have three specimens - one about the size of the type specimen, dredged by Dr Verco in Backstairs Passage (?), one from Corney Point, and the other from Port MacDonnell. It is probably a deep-water shell. I have been unable to detect the "golden spots" on any of my specimens, but one was identified by Mr. Matthews. It is similar to *C. verconis* and *C. limans*, but the girdle scales differentiate it from either. Mr. Martin's specimen is very handsome, a bright reddish-brown colour all over, mottled with dark splashes. It measures 19 x 11 mm.

*Aulacochiton cimolius*  
36. *Lorica volvox*, Reeve, 1847.

*Chiton volvox*, Reeve, Conch. Icon., sp. 31; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 237.

*C. cimolius*, Reeve, Conch. Icon., sp. 14.

*Lorica cimolia*, H. and A. Adams, Ann. Mag. N.H. (2), ix., p. 355; Angas, P.Z.S., 1867, p. 224; 1871, p. 97.

*Aulacochiton volvox*, Shutt., Bun. Mittheil, 1853, p. 68.

*Chiton rufus*, (?) Hutton, Trans. N.Z., Inst., iv., 1872, p. 179; Man. N.Z. Moll., 1880, p. 113. F5748

*Lorica volvox*, Reeve: Haddon, "Challenger" Polyplac., p. 31; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 153; Suter, Proc. Mal. Soc., London, vol. vii., part 5, June, 1907, p. 297.

I have specimens from Cape Jaffa, Normanville, Second Valley, Marino, Wool Bay, Hardwicke Bay, Corney Point, and some very handsome specimens, with dark-brown dorsal areas, measuring 76 x 45 mm., from St. Francis Island. It has been dredged by Dr. Verco in Gulf St. Vincent, and Mr. A. R. Riddle reports it from Black Hill, near Port Moorowie. In one or two samples I have noticed spiny tufts similar to the *Acanthochitidæ*. I cannot detect any sign of tufts in full-grown specimens. *L. volvox* is often encrusted with limy matter.

37. **Loricella angasi**, Adams and Angas, 1864.

*Lorica angasi*, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 193; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 238.

*Loricella angasi*, Adams and Angas: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 87; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 153. F5747

Found in deep water, sometimes washed up on the beach after storms. It is reported from Sultana Bay (Matthews),

Rapid Bay (Angas), Holdfast Bay (Bednall), and New South Wales (Cox, Brazier). I have specimens dredged by Dr. Verco in Backstairs Passage, and either good specimens or valves from Cape Jervis, Normanville, Aldinga, and Brighton. The splashes of pink colouring are very vivid when preserved in spirits. The peculiarly large and broad anterior valve easily differentiates this species from *L. volvox*. It flattens itself so closely to the rocks and is so covered with foreign growth that I have had the greatest difficulty in detecting one on a rock which I had been examining for some minutes.

Fam. MOPALIIDÆ, Pilsbry.

38 *Plaxiphora albida*, Blainville, 1825. F544

*Chiton albidus*, Blainville, Dict. Sci. Nat., 1825, vol. xxxvi., p. 547; Pilsbry, Man. Conch., 1893, vol. xv., p. 105.

*C. glaucus*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 376.

(?) *C. petholatus*, Sowerby, Mag. Nat. Hist., new series, iv., p. 289, May, 1840; Conch. Illustr., f. 64, 65, and var. *porphyrius*, f. 59.

*Chætopleura conspersa*, Adams and Angas, P.Z.S., 1864, p. 193; P.Z.S., 1865, p. 187.

*Plaxiphora albida*, Blainville: Thiele, Zool. Chun, 1909, Heft lvi., p. 24, pl. iii., figs. 22, 23.

*P. tasmanica*, Blainville: Thiele, loc. cit., p. 25, pl. iii., figs. 24-26.

*P. bednalli*, Blainville: Thiele, loc. cit., p. 25, pl. iii., figs. 27-30.

*P. petholata*, Sowerby: Pilsbry, Man. Conch., vol. xiv., p. 323; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 154.

*P. albida*, Blainville: Iredale, Proc. Nat. Soc., London, vol. ix., part 2, June, 1910, p. 98.

South Australian chiton-hunters will always be grateful to Mr. Iredale for his elaborate paper on the *Plaxiphoras*, and to Dr. Thiele for his "Revision des Systems der Chitonen." But we part with the old name of *petholata* with regret. Sowerby's description of *petholata*, loc. cit., is a complete account of our *albida*, while Blainville's description of *albida* in Pilsbry, loc. cit., is very poor, and might be that of any of our *Plaxiphora*. Is not there a danger in making the posterior valve the basis of decision? I have several hundred specimens of *Plaxiphora* before me from all parts of Australia, most of them collected by myself, and the tail valves differ so much in the same species according to size and growth that I agree with Iredale that Dr. Thiele, "through lack of specimens, has laid too much stress upon the value of the shape of the valves." The three South Australian *Plaxi-*

F544

*phora* are easily separated. The zigzag markings of *albida* (? *petholata*), the smooth reticulated markings of *costata* (? *glauca*), and the strongly raised nodules of the lateral area in *matthewsi* (? *conspersa*) make the separation easy except in worn specimens.

Mr. Gatliffe, of Victoria, has taken considerable pains in identifying the *Plaxiphora*, and agrees with Dr. Thiele in identifying our *P. glauca* with *P. albida*, Blainville.

*P. albida* is often found at and above high-water mark, and generally adheres to one spot without moving about like other chitons. At Robe I have seen hundreds alive, blistering in the sun. I have collected it all around the coast of South Australia, from Port MacDonnell to Streaky Bay, as well as Queensland, Victoria, and Tasmania. Going out from Streaky Bay 40 miles to St. Francis Island, *P. costata* takes the place of *albida*, and that would seem to continue right on to Western Australia, for I obtained *costata* at Albany, Bunbury, Rottnest Island, and saw nothing of *albida*.

I don't know if pearls are often found in chitons, but I extracted a blue egg-shaped pearly substance from the interior edge of a *Plaxiphora albida*.

*Poneroplax conspersa*  
39. *Plaxiphora matthewsi*, Iredale, 1910.

*Plaxiphora conspersa*, non Adams and Angas: Bednall, Proc. Mal. Soc., London, 1897, vol. ii., p. 154.

*P. matthewsi*, Iredale, Proc. Mal. Soc., London, vol. ix., part ii., June, 1910, p. 99.

This is the rarest of South Australian *Plaxiphora*. It is found in deeper water than either *albida* or *costata*. Its great breadth in proportion to its length easily distinguishes it from either of these. I have specimens from Marino, Troubridge, Second Valley, and St. Francis Island. I have also collected it on the north-west coast of Tasmania. Iredale's description, *loc. cit.*, is very good, but the absence of plates is a hindrance to identification.

The description of *Chatopleura conspersa*, Adams and Angas, P.Z.S., 1864, p. 193; Angas, P.Z.S., 1865, p. 187, agrees so well with *matthewsi* that I place it under a new nomenclature with considerable diffidence.

A very pretty half-grown specimen was taken by Mr. F. L. Saunders at Port Noarlunga. The nodules on the lateral areas are like tear-drops.

*Poneroplax*  
40. *Plaxiphora costata*, Blainville.

*Chiton costatus*, Blainville, Dict. Sc. Nat., xxxvi., p. 548; Pilsbry, Man. Conch., vol. xv., p. 105.

*C. glaucus*, Quoy and Gaimard, Voy. "Astrolabe," Zool., iii., p. 376.

3 closely allied  
1. slightly only  
variations of  
same species.

*P. glauca*, Quoy and Gaimard: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 154; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 325; Suter, Journ. Mal., 1905, vol. xii., part 4, p. 66.

*Plaxiphora costata*, Blainville: Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 97; Thiele, Zool. Chun., 1909, Heft lvi., p. 24.

Mr. Gatilffe, of Victoria, identifies this shell with *P. bednalli*, Thiele.

I have specimens from Port MacDonnell, Robe, Middleton, Bluff, Encounter Bay, Second Valley, Noarlunga, Wool Bay, Troubridge, Hardwicke Bay, Spencer Gulf, and St. Francis Island. Only an occasional specimen is found on the South-East coast. Numbers were found at Port Noarlunga by Mr. F. L. Saunders. It is more common in Spencer Gulf, and is abundant on St. Francis Island. I have also collected it in Tasmania and in several places in Western Australia. Blainville's description of this shell, in Pilsbry's Manual, *loc. cit.*, is very unsatisfactory. Quoy and Gaimard's description of *P. glauca* does not correspond with my specimens in every particular. I can find no marginal striae in the anterior portions of the valves. The whole of the shell in unworn specimens is covered with minute microscopic granulations or reticulations. Some specimens have beautiful parallel longitudinal lines of green and black on the median valves. It has seven or eight riblets on the anterior valves.

Fam. ACANTHOCHITIDÆ, Pilsbry.

41. *Acanthochites asbestos* <sup>sutural</sup> Smith, 1884

*Chiton (Acanthochiton) asbestos*, Carpenter, MS.: Smith, Zool. Coll. "Alert," p. 83, pl. vi., fig. 6; Pilsbry, Man. Conch., ser. i., vol. xv., p. 17.

*Acanthochites asbestos*, Carpenter: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 79; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 155.

Pilsbry's description of the Fam. *Acanthochitidæ* is very helpful. The South Australian species are constantly being increased, and a splendid opportunity awaits a student who will make this field a special study. The *Acanthos.* differ from nearly all other chitons by having tufts at the sutures, by the large fleshy girdle, and there being little or no distinction between the lateral and pleural areas.

The golden or silvery tufts of *asbestos*, lying neatly along the suture between the valves, easily distinguishes it from other *Acanthos.*

I have found it in numbers in a sheltered cave at high-water mark on Kangaroo Island. I have specimens from

Beachport, Aldinga, Ardrossan, Stansbury, Point Soutar, Minlacowie, Streaky Bay, and all along the West Coast to St. Francis Island, Albany (Western Australia), and San Remo (Victoria). Dr. Verco has dredged it in Gulf St. Vincent.

Tom Iredale, in Proc. Mal. Soc., London, vol. ix., part 3, September, 1900, p. 155, quotes Dr. Thiele ("Revision des Systems der Chitonen," i., p. 48), "that *lueurii*, Blainville, must replace the familiar *asbestoides*, Smith."

#### 42. *Acanthochites*<sup>AN</sup> *bednalli*, Pilsbry, 1894.

*Acanthochites bednalli*, Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 81; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896. F523-1

After going through a great number of specimens of this species and *A. granostriatus*, I am unable to separate them. A series shows the striations in the dorsal area to vary from almost smooth to deep microscopic sulci. I have only one specimen of *A. coxi* from New South Wales. If it had been found in South Australia, I should certainly put it in with *A. bednalli*.

It occurs all around the coast of South Australia. Specimens in my collection are from the South-East (Port MacDonnell, Middleton), Gulf St. Vincent (Second Valley, Normanville, Aldinga, Marino, Sultana Bay (Troubridge), Spencer Gulf (Corney Point, Minlacowie), West Coast as far as St. Francis Island. A number of very large specimens, measuring 30 × 14 mm., were found at Kangaroo Island. I have similar ones from Port MacDonnell, Troubridge, and the West Coast.

#### 43. *Acanthochites*<sup>AN</sup> *granostratus*, Pilsbry, 1894. F523-4

*Acanthochites granostriatus*, Pilsbry: Nautilus, vol. vii., 1894, p. 119; Proc. Acad. Nat. Sci., Philad., 1894, p. 81, pl. ii., figs. 1-6, pl. iv., fig. 37; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

Similar to *A. bednalli*. Found all along the coast from Port MacDonnell to St. Francis Island.

#### 44. *Acanthochites speciosus*, H. Adams, 1861.

*Cryptoplax (Notoplax) speciosus*, H. Adams, Proc. Zool. Soc., 1861, p. 385. F528-9

*Acanthochites speciosus*, H. Adams: Pilsbry, Man. Conch., ser. i., vol. xv., p. 32, pl. i., figs. 23-26; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 91.

*A. (Notoplax) speciosus*, H. Adams: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 83, pl. iv., figs. 31-33.

This very hairy chiton, with a girdle, when alive, four or five times wider than the tegmentum, is rare. I have specimens from Aldinga, Marino, Stansbury, and St. Francis Island. Dr. Verco dredged some very large specimens in Gulf St. Vincent. I have one specimen from Stansbury with three very distinct horny riblets on the anterior valve. This may be a monstrosity or a new variety of *speciosus*. I found one specimen at Albany, Western Australia, in which the riblets in the interior valve are distinct but nodulose. Mr. Maughan found a fine specimen washed ashore at Aldinga.

### *Bassettellia*

45. *Acanthochites* (*Notoplax*) *matthewsi*, Bednall  
and Pilsbry, 1894. F534-5

*Acanthochites matthewsi*, Bednall and Pilsbry: Nautilus, vol. vii., 1894, p. 120; (*Notoplax*?) Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 83, pl. iv., figs. 27-30; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 91.

This is the most beautiful and elaborately sculptured of all South Australian *Acanthochitidae*. It somewhat resembles *A. glyptus*, Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 92. I have specimens from Robe, Cape Jaffa, Normanville, Marino, and valves (?) from St. Francis Island. I have seen them collected by Rev. S. J. Martin at Wool Bay. Mr. F. L. Saunders has taken it at Port Victor. A number of specimens were taken from the stomach of a whiting caught near Edithburgh. Robe specimens in spirits measure 30×15 mm. The girdle is very fleshy and wider than the valves themselves. They are of a very delicate milky colour, crossed with splashes of green. Pilsbry evidently had only a dried specimen. The specimens from Cape Jaffa and Normanville are of a ruddy tint--stained, I think, by their proximity to some ferruginous matter on lighthouse or jetty. One remarkable feature in nearly every specimen collected has been the presence of a light-green marking at the beak of the dorsal area on the fifth valve. This helps to distinguish this shell in nearly every instance.

*bassettellia*  
46. *Acanthochites* (*Loboplax*) *variabilis*, Adams  
and Angas, 1864. F571

*Hanleya variabilis*, Adams and Angas, Proc. Zool. Soc., 1864, p. 194; Pilsbry, Man. Conch., ser. i., vol. xv., p. 101.

*Acanthochites* (*Notoplax*?) *variabilis*, Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 84.

*A. (Loboplax) variabilis*, Adams and Angas: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Hedley and Hull, Records Australian Museum, vol. xii., No. 4, 1909, p. 266.

This is the most widely distributed of all South Australian *Acanthochitons*. I have found it all around the coast from Port MacDonnell to St. Francis Island. It is found on the South-East coast, St. Vincent and Spencer gulfs, and on the West Coast as well as on Kangaroo Island. I have specimens from twenty-three different places. The pinnatifid appearance of the dorsal area and the very tiny spicules at the sutures, sometimes only horny protuberances, easily differentiate this species from other *Acanthos*. It assumes every variety of shade and colour from a creamy-white to almost black, greens generally predominating. Lighter-coloured varieties are plentiful on Kangaroo Island and the west coast of Yorke Peninsula.

In young specimens the girdle of the *Acanthos* is very small, but when full-grown it has a large fleshy girdle, often twice as wide as the tegmentum. If not kept in spirits this girdle shrinks up considerably.

### *Acanthochites*

47. *Acanthochites crocodilus*, Torr and Ashby, 1898.

*Acanthochites crocodilus*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 216, pl. vi., fig. 2.

Two specimens were found at a very low tide at Marino, one valve was taken by Mr. Klem at Corney Point, and Mr. Hedley, Records Aus. Mus., vol. vii., No. 2, 1908, Hedley and May, reports having taken it off the coast of Tasmania. May and Torr, Proc. Roy. Soc., Tasmania, 1912, pp. 35, 36, say this is not *crocodilus*.

The remarkably foliated appearance of the dorsal area and the shagreened pustules on the latero-pleural area make it easy to distinguish this rare species.

### *Acanthochites pedoplax*

48. *Acanthochites cornutus*, Torr and Ashby, 1898.

*Acanthochites cornutus*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217, pl. vi., fig. 3.

This is evidently a deep-water species. It was dredged by Dr. Verco in 14 fathoms off Ardrossan. Mr. A. R. Riddle took one at Wool Bay. Specimens have been taken at Marino, Normanville, and St. Francis Island.

Its pinnatifid dorsal area, decided carination, and regular rows of pustules are its distinguishing features. Mr. Hedley found eyes on the dorsal area of *A. cornutus*. He used  $\frac{1}{4}$ -in. lens.

49. *Acanthochites*<sup>ON</sup> (*Notoplax*) **wilsoni**, Sykes, 1896. *F525*

*Acanthochites (Notoplax) wilsoni*, Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 92, pl. vi., figs. 2, 2a.

*A. verconis*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217, pl. vi., figs. 4a-f.

I have to thank Mr. Hedley for drawing my attention to the similarity between *A. wilsoni* and *A. verconis*. I have gone through a number of specimens. There is a great difference between the small and large specimens in colour-markings, the smaller being pearly-white mottled with rose-pink and seemingly more carinated, while the larger specimens are reddish to a deep maroon tint.

Taken in dredgings in St. Vincent and Spencer gulfs by Dr. Verco, by Mr. Ashby at Aldinga, Mr. Kerrison at Cape Jaffa, by Mr. Basset Hull on Long Reef (New South Wales), and by the writer at Robe, Marino, Kingscote, and Minlacowie.

Sykes' description is ably assisted by Mr. Hedley's drawings in Torr and Ashby's paper, *loc. cit.*

50. *Acanthochites*<sup>ON</sup> **maughani**, Torr and Ashby, 1898. *F518*

*Acanthochites maughani*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 218, pl. vii., figs. 5a-f; Hedley and Hull, Records Australian Museum, vol. vii., No. 4, 1909, p. 265.

This species has been found only at Port Victor (Maughan), Bottle and Glass Reef, and Freshwater Bay, New South Wales (Hedley and Hull). I have a number of New South Wales specimens in spirits.

*Acanthochites lachrymosus*, May and Torr, just being published (1912) by the Royal Society of Tasmania, is somewhat similar to *A. maughani*. The shell is much larger, 26×10 mm., but on comparing a co-type with the type of *maughani*, though there is a striking resemblance in detail, there are decided differences.

51. *Acanthochites exilis*, Torr and Ashby, 1898. *F512-3*

*Acanthochites exilis*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 218, pl. vii., figs. 6a-f.

Three specimens of this very diminutive chiton were dredged by Dr. Verco in 15 fathoms in Spencer Gulf. It is the smallest of all our South Australian *Polyplacophora*, and may be easily distinguished by the bright-red dorsal area of the third valve. One very handsome specimen, measuring 3×2 mm., was dredged by Dr. Verco in 15 fathoms off Wallaroo.

52. *Acanthochites*<sup>ON</sup> *tatei*, Torr and Ashby, 1898.

*Acanthochites tatei*, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 219, pl. vii., figs. 7a-f.

One specimen only of this beautiful little *Acantho* was found at Middleton, Encounter Bay, by the writer. Mr. Gabriel reported finding one at Torquay, Victoria. F523-4

*Notoplax rostrata*  
53. *Acanthochites costatus*, Adams and Angas, 1864.

*Acanthochites costatus*, Adams and Angas, P.Z.S., 1864, p. 194; Angas, loc. cit., 1867, p. 224.

*Macandrellus costatus*, Dall, Proc. U.S. Nat. Mus., i., p. 81, f. 40 (dentition).

*Chiton (Macandrellus) costatus*, E. A. Smith, Zool. Coll. "Alert," p. 83, t. 6, fig. F. F531

*Acanthochites costatus*, Adams and Angas: Pilsbry, Man. Conch., ser. i., vol. xv., p. 40, pl. iii., fig. 74.

I have seen two specimens of this chiton. It was taken by Mr. Klem at Corney Point and named by Mr. Bednall. One other very similar I have from St. Francis Island. This shell agrees with the description in Pilsbry, *loc. cit.*, with the exception of the colour, which is of a pinkish hue, and the posterior valve has not the "six more or less distinct radiating ridges," as described by Smith from Coppinger's collection. Mr. Klem's specimen has a hairy girdle. The St. Francis Island specimen is fleshy.

Fam. CRYPTOPLACIDÆ, Dall.

54. *Cryptoplax striatus*<sup>a</sup>, Lamarck, 1819.

*Chitonellus striatus*, Lamarck, An. S. Vert., vi., p. 317, 1819; Desh. in Lam., vii., pp. 481, 136; Sowerby, Genera of Shells, t. 139, f. 4; Conch. Illustr., f. 62; Blainville, Dict. Sc. Nat., xxxvi., p. 555, 1825; Reeve, Conch. Syst., ii., t. 135, f. 1; Conch. Icon., f. 4. F539

*C. gunnii*, Reeve, Conch. Icon., f. 5, 1847.

*C. rostratus*, Reeve, loc. cit., f. 6.

*C. oculatus*, Reeve, loc. cit., f. 7a,b (not of Quoy and Gaimard).

*Cryptoplax striata*—*gunni*—*rostrata*, H. and A. Adams, Gen. Rec. Moll., i., p. 484; Angas, P.Z.S., 1867, pp. 224, 225.

*Chiton (Chitonellus) striatus*, Smith, Zool. Coll. "Alert," p. 84.

*Cryptoplax striatus*, Haddon, "Challenger" Report, xv., p. 39, t. 1, f. 9; t. 3, f. 9a-9m.

*C. striatus*, Lamarck, var. *gunnii*, Reeve; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 157; Torr, Trans. Roy. Soc., S.A., 1911, p. 100.

After examination of a large number of specimens from many parts of Australia, I have satisfied myself that the

*Chitonellus striatus* of Lamarck describes our South Australian species admirably. Most of the specimens are covered with soft velvet seal-like hair, which hardens into bristles when dried. I have a few hairless specimens, but this may be accounted for by local attrition or disease. The breadth of the valves varies so much in *striatus* that there seems no room for var. *gunnii*.

*C. striatus* is found all around the coast of Australia and Tasmania. I have collected it in about twenty places on the South Australian coast from Port MacDonnell to Nuyt Archipelago. The valves in some specimens are of a rich deep salmon-pink, while others are a dark-brown. The girdle is of a nut-brown when alive, going darker as it dries. It delights in the recesses of bunches of *Serpularia*, and I have taken macerated specimens from the stomach of a schnapper. I have seen living specimens nearly a foot long. I have dried ones  $90 \times 10$  mm.

### *edactoplax*

55. *Gallochiton mayi*, Torr, 1912. Pl. v., figs. 1a-f.

*C. mayi*, Torr, Proc., Roy. Soc. Tasmania, 1912, p. 1. *F354*

*General Appearance*.—Shell oblong, very much elevated, strongly carinated, side slopes straight. *Colour*.—Creamy-white variegated with splashes of reddish-brown; the anterior and posterior valves are nearly always red, and this colour extends to the girdle.

*Anterior Valve*.—Red, smooth to the unaided eye, but microscopically regularly granulated and dotted all over with minute black dots which look like eyes, 14 to 16 pectinated teeth.

*Median Valve*.—*Lateral area* distinctly raised, smooth or with slight growth-lines. A broad shallow transverse sulcus in the centre of the area containing numbers of eye-dots somewhat regularly arranged. On one lateral area on one side of a valve 61 of these eye-dots were counted.

*Pleural area* deeply longitudinally sulcated with eight to twelve grooves, extending from the margin to the dorsal area, but growing shorter towards that area.

*Dorsal area* triangular, with microscopical irregular striations running into the pleural area.

The median valves have two distinct slits.

*Posterior Valve*.—Divided into two distinct areas by a raised riblet, the posterior part being similar in colour and granulations to the anterior valve, and the upper part creamy-white with splashes of red, microscopically granulated, numerous eye-dots, mucro median. The division between the two parts of this valve is very distinct. The pleural area has the same longitudinal sulci as that of the median valve.

*Interior of Shell.*—Porcelaneous, with raised riblets on posterior part of valve, sinus shallow and wavy, sutural laminæ very short.

*Girdle.*—Covered with irregular appressed spinelets, coarser towards the outer margin. In curled specimens these spines are erect, creamy-white with red splashes.

*Measurement.*— $10 \times 5$  mm.

*Hab.*—Dredged by Dr. Verco in Spencer Gulf. One specimen was found by the writer on the north-west coast of Tasmania, and another from the same locality is in the possession of Mr. Basset Hull.

*Remarks.*—I have had considerable difficulty in determining the genus of this shell. It has pectinated teeth and eyes like *Tonicia*, but the girdle is not leathery, nor are the valves so polished. It may be a *Chatopleura*. The description is repeated, as the dredged South Australian specimens differ from the account given by Dr. Torr in the Proc. Roy. Soc., Tasmania. No eye-dots can be seen in the Tasmanian specimen.

### *Parachiton*

56. *Lepidopleurus pelagicus*, sp. nov. Pl. v., figs 2a-f.

*General Appearance.*—Ovate, decidedly arched and strongly carinated. Side slopes straight. The shell gradually tapers towards the tail valve. The valves overlap the girdle. *Colour.*—Uniform, pale sulphur-yellow; the girdle has a slightly deeper shade, almost brown when dried.

F66

*Anterior Valve.*—Broader than the median valves. It has three or four concentric grooves or growth markings parallel to the girdle, crossed by a number of minute striations converging towards the apex. The interior is pearly-white. No dentition nor sutural laminæ. The posterior edge of the valve is serrated.

*Median Valve.*—The lateral area is gradually elevated above the central area. The whole of the valve is covered with minute tubercles in longitudinal rows in the dorsal and pleural areas. Under the microscope, these appear like strings of beads. The rows are transverse in the lateral areas. The sutural plates are diminutive and semi-transparent, the sinus very broad. The posterior edge of the valve is serrated. Interior pearly and semi-transparent, the striations of the tegmentum distinctly shows through.

*Posterior Valve.*—Muco median elevated, with concave slope to girdle. Pustulose liræ converge to the muco. Sutural plates delicately diminutive.

*Girdle.*—Leathery and spiny to the unaided eye. Under  $1\frac{1}{2}$ -in. lens it is covered with minute specules.

*Measurement.*—Dried,  $8 \times 4$  mm.

*Hab.*—Dredged by Dr. Verco from 130 fathoms off Cape Jaffa. Several valves were dredged from 300 fathoms off the south-east coast of South Australia.

*Remarks.*—In detail this shell strongly resembles *Lepidopleurus inquinatus*, but the whole shell is much more carinated and the lateral areas differ in the massing of the pustules.

*Tuleterenochiton*

57. *Ischnochiton bednalli*, sp. nov. Pl. v., figs. ~~54, 55~~ F467.

*General Appearance.*—Elliptical, valves wide, rounded, slightly carinated, side slopes curved, cream colour uniform in valves and girdle. The posterior margins of the valves project considerably and give a verandah-like appearance. The valves are exceedingly delicate.

*Anterior Valve.*—Two or three ill-developed grooves or growth-lines parallel to the girdle crossed by about twenty microscopically pustulose liræ converging towards the apex. About twenty slits with regularly scalloped pectination between.

*Median Valve.*—Dorsal area uniform in width composed of five or six rows of pustules either worn or compressed. Pleural areas divided into five irregular diagonal rows of pustules by reticulated sulci, which gives the appearance of open network. Lateral areas distinctly raised and crossed transversely with four rows of pustulose liræ converging towards the dorsal area. Four of these pustules project from the posterior margin. Interior pearly-white. Valves project considerably. Sutural laminæ small and delicate. Sinus very wide. Diminutive slit rays under  $\frac{1}{4}$ -in. lens.

*Posterior Valve.*—Mucro ante-median almost covered by the seventh valve. Concave between the mucro and the girdles. The mucro is covered with pustules, and the rest of the valve has two or three concentric rings of pustulose liræ parallel to the girdle. The pustules grow smaller towards the mucro. About twenty-six slit rays.

*Girdle.*—Covered with microscopically striated scales.

*Hab.*—Two specimens only from St. Francis Island, Nuyt Archipelago, Australian Bight.

*Measurement.*—Dried specimen,  $6 \times 3$  mm.

*Remarks.*—I have named this chiton after Mr. Bednall, the doyen of Polyplacophora work in Australia. It is an exquisite chiton, and somewhat resembles *Ischnochiton pilosbryi* and *Lepidopleurus inquinatus*.

167

*Gastropodoplax variabilis*

58. *Acanthochites rufus*, sp. nov. Pl. vi., figs. 4*a-f*.

*General Appearance.*—Elliptical, roundedly arched, much more so than *A. variabilis*, valves beaked, colour uniformly terra-cotta.

*Anterior Valve.*—Five very indistinct riblets, which are really waves in the pustules. The pustules are in regular lines, appearing continuous with those on the second valve.

*Median Valve.*—Covered with pustules arranged in longitudinal liræ. There is little difference between the dorsal, lateral, and pleural areas. There are about twelve rows of these pustules on the latero-pleural area divided by sulci, and about fourteen rows on what may be termed the dorsal area. The microscopic pustules in these are much smaller than those in the latero-pleural areas. There is a gradual elevation towards the posterior end of each valve, and the pustules in this lateral region are more irregular.

F511

*Posterior Valve.*—Muero very indistinct, post median. A deep sulcus parallel to the girdle separates it from the outer edge of the shell. Rows of pustules converge towards the muero and appear continuous with the rows on the median valves. Nine rows on the latero-pleural areas and twelve on the dorsal areas. The muero is almost at right angles to the girdle, and the rows of pustules are concentric below the muero.

*Girdle.*—Leathery, very narrow in dried specimen, covered with spinelets. Five corneous spots on the girdle surrounding the anterior valve and one at each suture, very indistinct in some.

*Measurement.*— $10 \times 5$  mm.

*Hab.*—One specimen only from Kangaroo Island.

*Remarks.*—The detailed description of this shell approaches *A. variabilis*, but the absence of the distinction between the dorsal and the latero-pleural areas and the marked difference in the appearance and shape of the shells when placed side by side make it necessary to place it in a new species.

The name *rufus* is given on account of its rich terra-cotta colour.

59. *Acanthochites kimberi*, sp. nov. Pl. vi., figs. 5*a-f*.

*General Appearance.*—Long, narrow, tapering towards the ends. Valves rounded, beaked. *Colour.*—Either cream with splashes of dark- and light-green or, in some specimens, the green predominating over the cream with splashes of pink on some valves.

F515

*Anterior Valve*.—Three sharply-defined riblets. Covered with rounded or oblong pustules larger at the margin and decreasing in size towards the apex. Interior pearly. Insertion plates deep, three slits.

*Median Valve*.—Dorsal area, wedge-shaped, foliated, covered with microscopic triangular pustules. Alternate black and white spots separate the dorsal from the pleural areas. Latero-pleural area, covered with irregular rounded and elliptical tubercles, small near the dorsal area, growing much larger as they approach the girdle and the posterior edge. Sinus broad, insertion plates deep, one slit on each side.

*Posterior Valve*.—Diminutive, mucro median, a distinct dorsal area similar to the median valves with irregular pustules below the mucro. Five microscopic riblets run from the mucro to the eaves. The dorsal area is concave. Articulamentum, bluish-green, rounded, excavated, deep insertion plates, two slits.

*Girdle*.—Leathery, covered with spinelets. Five erect silvery tufts stand out prominently around the anterior valve and one tuft at each suture. The hollows in which these tufts are placed is surrounded by a prominent ridge.

*Hab.*.—Aldinga (by Mr. Kimber, after whom the shell is named), Kangaroo Island.

*Measurement*.—Dried specimen,  $10 \times 4$  mm.

*Remarks*.—I have four specimens, varying somewhat in appearance, but similar in detail.

#### 60. *Ischnochiton levis*, sp. nov. Pl. vi., figs. 6a-j. *Flatty*

*General Appearance*.—Smooth, rounded, decidedly carinate, pale-cream colour with spots of yellow, very broad in proportion to length, valves narrow.

*Anterior Valve*.—Smooth, except for a series of concentric growth-lines, microscopically granulated.

*Median Valve*.—Regular growth-lines appear over the dorsal, lateral, and pleural areas. The lateral areas are slightly raised, the growth-lines making four very large fine longitudinal riblets. The pleural area is minutely reticulated.

*Posterior Valve*.—Mucro ante-central. Two distinct areas, dorsal and pleural, consisting of microscopic regular granulations. The rest of the valve is smooth, almost flat, with two or three concentric lines. Eight or nine irregular slits.

*Girdle*.—Covered with rounded scales, microscopically striated.

*Measurement*.— $12 \times 6$  mm.

*Hab.*—Edithburgh (Mr. Matthews).

*Remarks.*—This belongs to the smooth variety of *Ischnochitonidae*. It resembles *I. wilsoni*, but its surface is not so granular. My one specimen is damaged. The name *levis* is given on account of its smoothness.

*Notoplex*  
61. *Acanthochites rubrostratus*<sup>A</sup>, sp. nov.

Pl. vii, figs. 7a-f.

F531

*General Appearance.*—Shell elliptical, broad, girdle wider than the valve. Tegumentum cream-coloured, dorsal areas bright-green tipped with rosy-pink, which gives it its name.

*Anterior Valve.*—Three to five distinct pustulose riblets with probably five slits. My dissected specimen was damaged. In one co-type the pustulated riblet becomes one elongated pustule. The tegumentum is covered with flattened pustules.

*Median Valve.*—The lateral area is separated from the pleural area by a rib covered with pustules. The lateral and pleural areas are covered with nine rows of rounded appressed pustules, somewhat regular, converging towards the apex. The dorsal area is narrow, corneous, showing growth-lines, no striae, somewhat foliated, one slit.

*Posterior Valve.*—Mucro posterior with rows of pustules between it and the girdle, to which it is at right angles. A dorsal area is seen which is almost smooth with irregular pustules on the sides. The interior is pearly, deeply hollowed, five slits, insertion plates large.

*Girdle.*—Leathery covered with minute spinelets, having long silky tufts at the sutures and five tufts around the anterior valve. In a spirit specimen the girdle is as wide as the valves.

*Measurement.*—Dried specimen, 11 × 6 mm.

*Hab.*—Two specimens from St. Francis Island and one collected by Mr. Baker at Henley Beach.

*Remarks.*—Somewhat resembles *A. speciosus*, but the girdle is very much smaller and is not continued between the valves. The *Acantho* tufts are also much more decided than in *speciosus*.

*concrectus*

62. *Ischnochiton bakeri*, sp. nov. Pl. vii., figs. 8a, b, c, f.

*General Appearance.*—Shell almost round, valves narrow, flattened, colour greyish-white mottled with brown.

*Anterior Valve.*—Covered with microscopic imbricating pustules, closely packed, resembling girdle scales.

FH 82

*Median Valve*.—Dorsal area, triangular, smooth, spotted. Lateral areas distinctly raised with four or five irregular pustules. Median valves covered with microscopic granules.

*Posterior Valve* is missing.

*Girdle*.—Covered with imbricating striated scales. The outer edge of the girdle is fringed with delicate specules.

*Measurement*.— $4 \times 3$  mm.

*Hab.*.—Henley Beach (Mr. Baker).

*Remarks*.—Strongly resembles a juvenile *Loricella angasi*, but its striated girdle-scales distinguish it. I have much pleasure in naming it after its discoverer.

#### EXPLANATION OF PLATES.

*a*—Dorsal view of entire shell.

*b*—Anterior valve.

*c*—Median valve.

*d*—Posterior valve.

*e*—Lateral view of posterior valve.

*f*—Portion of girdle magnified.

The sizes of type specimens are marked in each case.

#### PLATE V.

*1a,b,c,d,e,f*—*Callochiton mayi*, Torr.

*2a,b,c,d,e,f*—*Lepidopleurus pelagicus*, sp. nov.

*3a,b,c,d,e,f*—*Ischnochiton bednalli*, sp. nov.

#### PLATE VI.

*4a,b,c,d,e,f*—*Acanthochiton rufus*, sp. nov.

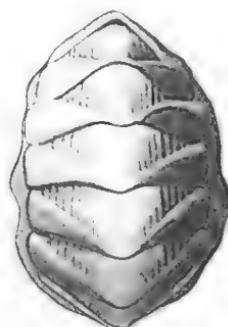
*5a,b,c,d,e,f*—*Acanthochiton kimberi*, sp. nov.

*6a,b,c,d,e,f*—*Ischnochiton levius*, sp. nov.

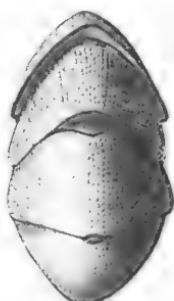
#### PLATE VII.

*7a,b,c,d,e,f*—*Acanthochites rubrostratus*, sp. nov.

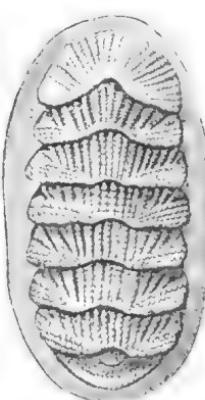
*8a,b,c,d,e,f*—*Acanthochites bakeri*, sp. nov.



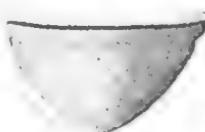
1a



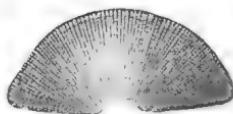
2a



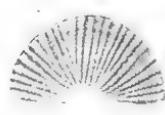
3a



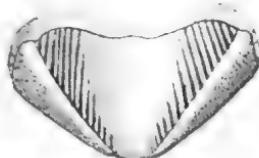
1b



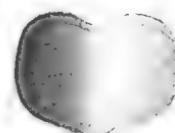
2b



3b



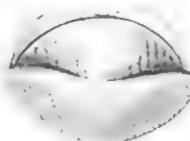
1c



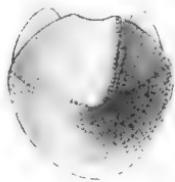
2c



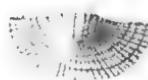
3c



1d



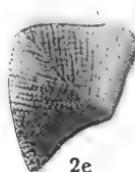
2d



3d



1e



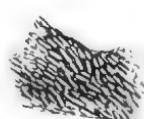
2e



3e



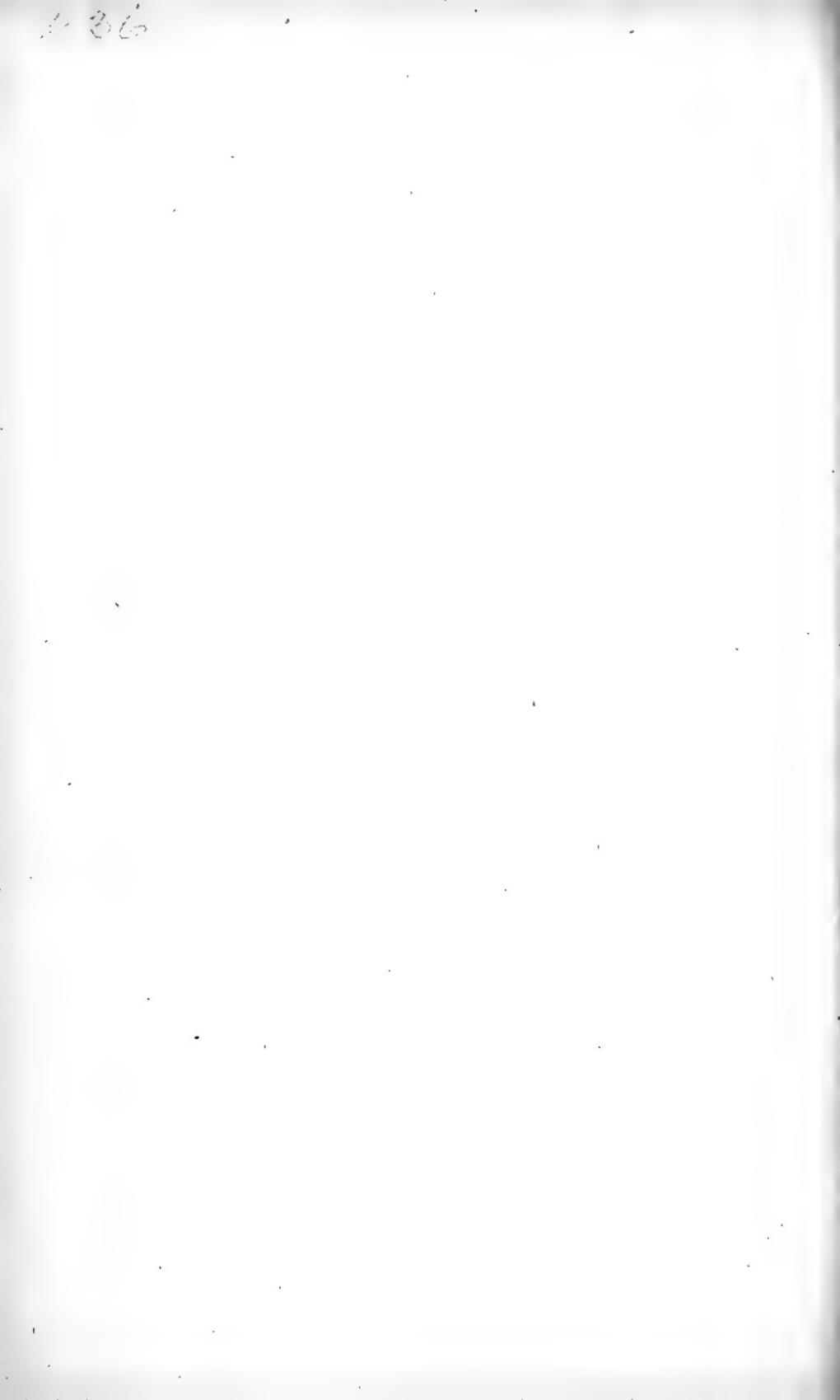
1f

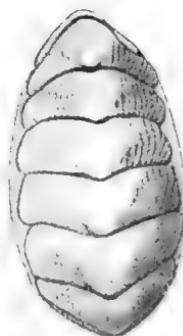


2f



3f

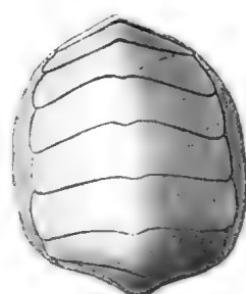




4a



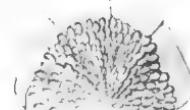
5a



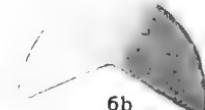
6a



4b



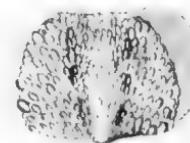
5b



6b



4c



5c



6c



4d



5d



6d



4e



5e



6e



4f



5f

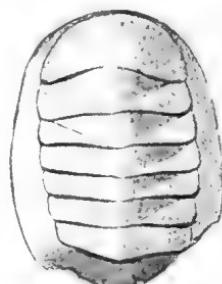


6f





7a



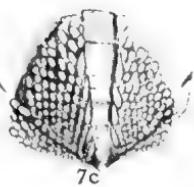
8a



7b



8b



7c



7d



8c



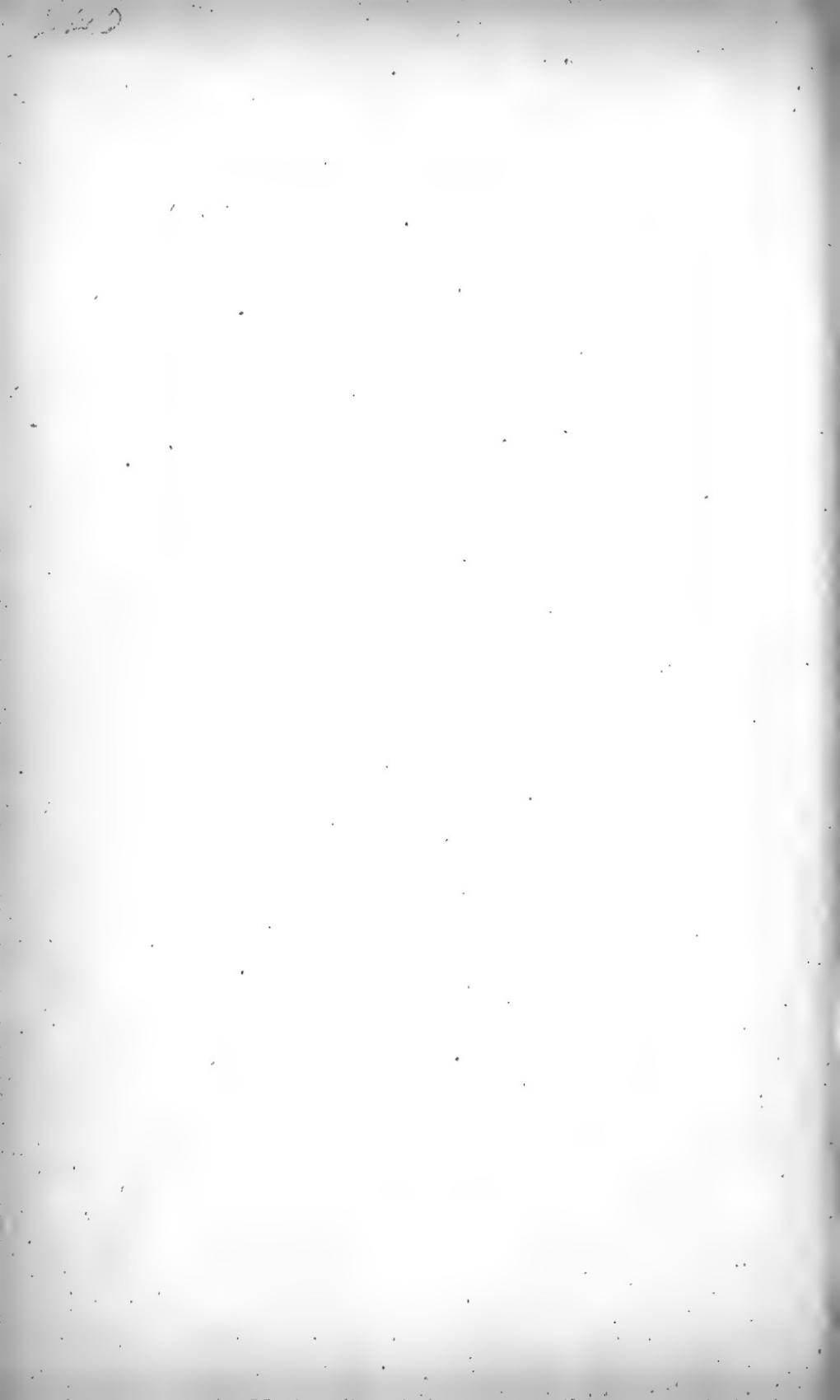
7e



7f



8f



Oct 1912

**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART XV.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvi., 1912.]

[Read October 10, 1912.]

**PLATES XV. AND XVI.**

This paper is a continuation of the series from page 215 of vol. xxxv. of 1911, and embraces all the known South Australian species of *Helcioniscus*, *Patella*, *Nacella*, *Acmaea*, *Phenacolepas*, *Haliotis*, *Scissurella*, and *Schismope*. It discusses also several species which have been attributed to South Australia, but are not recognized as occurring here.

*Bellana*

*teleioniscus tramosericus*, Martyn.

40

*Patella tramoserica*, Martyn, Univ. Conch., t. 16, P. (*Helcioniscus*) *tramoserica*, Martyn, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205.

*Helcioniscus diemenensis*, Philippi, Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 282.

Gatliff and Gabriel discarded the name *P. tramoserica*, Martyn, because the type locality was North America, and no Victorian specimen was exactly like his figure; but in answer to enquiries by Mr. Gabriel, Dall has since written that Martyn's species does not occur on the coasts of America, and that it is probably Australian or New Zealand. Very likely Martyn obtained it from Australia, but by mistake gave it an American habitat.

It occurs all along the South Australian coast from the east as far towards the west as Venus Bay. At St. Francis Island it is very rare and small, up to 18 mm.; so it seems to fade out along our west coast. It was not taken at any place along the south or west coast of Western Australia, its place being taken by *Patella neglecta*.

*Ostreaeinae*

*Helcioniscus illibratus*, Verco.

46

*Helcioniscus illibratus*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205, pl. x., figs. 6-14: *Type locality*—Spencer Gulf; Hedley, Commonwealth of Australia, Fisheries, part 1, 1911, p. 93, "100 fathoms, 40 miles south of Cape Wiles, South Australia."

Dredged in 15 to 20 fathoms off St. Francis Island, 5 dead. Taken in Western Australia, as far round as Rottnest Island.

*Cellana rubroaurantiaca* <sup>182</sup>  
*Heleioniscus-limbatus.*, Philippi.

41  
57

*Patella limbata*, Philippi, Abbild und Besch., Conch., vol. iii., p. 71; (*Heleioniscus*) Verco, Trans. Roy. Soc., S.A., 1907, vol. xxxi., p. 100.

It is very common, large, and beautiful in St. Francis Island, where *H. tramosericus*, Martyn, is very rare and small. I did not take it anywhere in Western Australia. Mr. Hedley in "The Marine Fauna of Queensland," in the Australasian Association for the Advancement of Science, 1909, p. 355, does not include either of these species, nor in his Addendum, p. 809. It would seem, therefore, to be restricted to Tasmania and the southern shore of Australia.

**Patella ustulata**, Reeve.

*Patella ustulata*, Reeve, Conch. Icon., 1855, vol. viii., pl. xxxi., figs. 88a, 88b; Verco, Trans. Roy. Soc., S.A., vol. xxx., 1906, p. 206, and vol. xxxi., p. 99.

Taken at Venus Bay, and many at St. Francis Island, up to 32 mm. long by 26 mm. broad.

*Patellanax*  
*Patella acuteata*, Reeve. *37* *squamifera*

*Patella acuteata*, Reeve, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 207.

Taken alive on the rocks on St. Francis Island up to 36 mm. by 26 mm., so that as far west as this the size is maintained.

*Patellanax chapmani* *36*  
*Patella stelliformis*, Reeve

*Patella stelliformis*, Reeve, Conch. Systematica, 1842, vol. ii., p. 15, pl. cxxxvi., fig. 3; Pilsbry, Man. Conch., vol. xiii., 1891, p. 98, pl. xvii., figs. 25-27, pl. lvi., figs. 62-65; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., part 3, p. 410.

*Patella pentagona*, Reeve, Conch. Icon., 1854, pl. xx., figs. 48a, 48b, 48c (non Born Mus. Test. Vindobonensis).

Var. *Patella chapmani*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 157; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208.

Var. *Aemaa alba*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), pp. 155, 156; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208.

I think Tate and May were right in regarding *P. chapmani*, Tenison-Woods, as conspecific with *P. stelliformis*, Reeve; but the two types are so unlike that the former may well be regarded as a good variety of the latter.

Taken at Rosetta Head, Encounter Bay (Tate), Tyringa Beach, Venus Bay, numerous and foliaceous but small, and Fowler Bay on the west coast; and on St. Francis Island up to 27 mm. by 20 mm. by 7.5 mm.

The species is rare and rather small on the South Australian coast, both the typical and the variant form, and it is only when we get west as far as St. Francis Island that we find it of fair size and in good variety. Here we take both the craggy typical shell and the extreme variant (*Acmaea alba*).

*Nacella*  
*Nacella parva*, Angas. = 51 *Nacella* 51

*Nacella parva*, Angas, Proc. Zool. Soc., 1878, p. 862, pl. liv., fig. 12; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208, and 1907, vol. xxxi., p. 101.

Taken on the beach at Sceales Bay, and at St. Francis Island in 6 fathoms, and in 15 to 20 fathoms, many and in good condition, with the axial line of dorsal spots of a delicate blue colour; in 35 fathoms, 2 much more depressed than those from shallower waters.

*Asteracmea*  
*Nacella crebrestriata*, Verco. = 49 49

*Nacella crebrestriata*, Verco, Trans. Roy. Soc., S.A., 1904, vol. xxviii., p. 144, pl. xxvi., figs. 20, 21; 1906, vol. xxx., p. 208; and 1907, vol. xxxi., p. 101.

see p 195

Dredged in 55 fathoms off Cape Borda, 1; taken on the beach at Venus and Sceales Bays, Port Sinclair, and St. Francis Island.

Var. *roseoradiata*, Verco. see p 195

Was taken at Guichen Bay and St. Francis Island.

*Asteracmea*  
*Nacella stowæ*, Verco. 48

*Nacella stowæ*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 209, pl. x., figs. 4, 5, and 1907, vol. xxxi., p. 101; Gatliff, Proc. Roy. Soc., Victoria, 1907, vol. xx. (New Series), part 1, p. 34, recorded for Victoria.

Kingston Beach, many; St. Francis Island beach, 4 good.

*Patelloidea*  
*Acmaea alticostata*, Angas. - 43 *Patelloidea* 43

*Patella alticostata*, Angas, Proc. Zool. Soc., London, 1865, p. 56, pl. ii., fig. 11; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 209.

Taken at Venus Bay and Port Sinclair, also on St. Francis Island, abundant, typical, good condition, and in considerable variety. *Radula*, pl. xvi., figs. 3, 4.

*conoidea*  
44 A ~~Acmaea~~ *flammea*, Quoy and Gaimard. 44.5

*Patelloidea flammea*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 354, pl. lxxi., figs. 15, 16; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 212.

A form like the type, which I have from the Derwent estuary, the type locality, has not been found by me in South

Australia. It is questionable whether this is really conspecific with *A. jacksoniensis*, Reeve, and *A. crucis*, Tenison-Woods.

*Var. A. jacksoniensis*, Reeve (*Patella*), Conch. Icon., vol. viii., 1855, pl. xxxix., figs. 127a and 127b.

*Var. A. gealei*, Angas (*Patella*), Proc. Zool. Soc., London, 1865, p. 57.

*Var. A. crucis*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 52.

Taken at Venus and Streaky Bays and St. Francis Island, many and various, with or without the cross.

### *Actinoleuca*

#### *Acmaea calamus*, Crosse and Fischer. = 54

*Patella calamus*, Crosse and Fischer, Journ. de Conch., 1864, p. 348, and 1865, p. 42, pl. iii., figs. 7, 8; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 211.

Sceales Bay, West Coast.

#### "*Var. polyactina*, nov. var. Pl. xv., figs. 1, 2. = 55

This is a colour variety. It has the shape of *A. calamus*, C. and F., though sometimes narrower in front, and has the fine radial sculpture. It may reach 21 mm. long by 17 mm. broad and 7 mm. high, but it has brown rays gradually widening, generally seven, the odd one in the posterior centre; but there may be six, or as many as fourteen, by secondary intercalation. They may be broken up into blotches or specks, and may tend to be united by reticulating spots and lines. The shell is sometimes polyangulate as well as rayed. They grade into typical *A. calamus*, Crosse and Fischer.

Gulf St. Vincent, Sceales Bay, Wallaroo Bay 15 fathoms.

#### *NOTOAcmaea-septiformis*, Quoy and Gaimard. = 56

*Patelloida septiformis*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 362, pl. lxxi., figs. 43, 44; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 215.

"Quoy gave it the name of 'septiformis,' because in colour it resembles the *Navicella*, called by some authors 'Septaires.'" —Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1836, vol. vii., p. 550.

Port Elliston, many, large, flat, and eroded; Streaky Bay, many and large; St. Francis Island, few and small.

#### *Acmaea marmorata*, Tenison-Woods. = 57

*Acmaea marmorata*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), pp. 156, 157; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 210.

It was taken at Venus and Streaky Bays, St. Francis Island, and Point Sinclair, along the west coast of South Australia. At Streaky Bay it may be 26 mm. long and at St.

Francis Island 19 mm. I did not find any examples anywhere in Western Australia, so that it would seem to disappear somewhere between St. Francis Island and Esperance. The examples from New South Wales and Queensland sent to me are much smaller than those taken at Guichen and Streaky Bays, which may be regarded as the metropolis of the species.

*NOTOAcmaea subundulata*, Angas. = 57

*Acmaea subundulata*, Angas, Proc. Zool. Soc., London, 1865, p. 155; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 214.

I took it alive in Streaky Bay in considerable numbers in very shallow water at low tide on wood and bottles and other shells, also at Murat Bay and on St. Francis Island, and at Esperance Bay, Western Australia.

**Phenacolepas calva**, Verco.

210

*Scutellina calva*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 9, 10; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 110, "100 fathoms, off Cape Pillar, Tasmania"; Hedley, Commonwealth of Australia, Fisheries, part 1, 1911, p. 93, "100 fathoms, 40 miles south of Cape Wiles, South Australia."

Dredged in 200 fathoms off Beachport, 3.

**Phenacolepas alboradiata**, Verco.

209

*Scutellina alboradiata*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 1, 2.

Gulf St. Vincent, depth unrecorded, 4; Salt Bay Creek, Edithburgh; 110 fathoms off Beachport.

SAN Nov 1933 *Illustrated Reprint Haliotis TRS 1943*  
*Haliotis albicans*, Quoy and Gaimard.

4

*Haliotis albicante*, Quoy and Gaimard, Voy. "Astrolabe," 1834, Zool., vol. iii., p. 311, pl. lxviii., figs. 1, 2. Type locality—"King George Sound, upon rocks at the entrance."

*Haliotis albicans*, Quoy and Gaimard, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 31, sp. 16; Reeve, Conch. Icon., 1846, vol. iii., pl. x., fig. 30; Philippi, Abbild. Besch. Conch., 1846, vol. ii., p. 69, pl. iv., figs. 1a and 1b; Angas, Proc. Zool. Soc., London, 1865, p. 183, recorded for South Australia; Sowerby, Thes. Conch., 1882, vol. v., p. 30, sp. 57, pl. iii. (430), fig. 20; Weinkauff, Conch. Cab. (Ed. Küster), Band. vi., Abt. 1.B., 1883, p. 71, pl. xxi., fig. 6, pl. xxviii., fig. 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 78, pl. v., fig. 27; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 407, Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 178, Victoria.

Taken all along coast of South Australia from Glenelg River to St. Francis Island.

Quoy used the specific name "albicante," which is grammatically correct, as *hous, hotis* is a neuter noun.

Lamarck and Sowerby give New Zealand as the habitat, but Hutton does not record it in his Manual of the New Zealand Mollusca, 1880, so it is probably a mistake.

In Adecock's Handlist of the Aquatic Mollusca of South Australia, 1893, p. 9, No. 366, it was given as *H. glabra*, Chemnitz, with *albicans*, Quoy and Gaimard, as its synonym.

*Haliotis elegans*, Koch. *not Schaw.*

*Haliotis elegans*, Koch, in Philippi, Abbild. und Besch. Conch., 1844, vol. i., p. 119, pl. i., figs. 1, 2; Reeve, Conch. Icon., 1846, pl. vii., fig. 21; Sowerby, Thes. Conch., 1882, vol. v., p. 27, Sp. 44, pl. xi. (438), fig. 82, and pl. xiv. (440 bis.), fig. 119; Weinkauff, Conch. Cab. (Ed. Küster), 1883, Band. vi., Abt. I.B., p. 51, Sp. 39, pl. xx., figs. 2, 4; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 103, pl. xiii., fig. 70; Adecock, Handlist, etc., 1893, p. 9, No. 370.

Koch gives as the type locality "the western shore of New Holland," but Reeve and all who follow give "Port Adelaide," including Pilsbry, who says he has not seen the species. Koch correctly says it is "very rare" and gives its proper habitat. But it has not been found at Port Adelaide nor anywhere along the southern coast of Australia to my knowledge. It occurs on the western shore of Australia. Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 51, writes:—"I have seen but two specimens, in the collection of my friend G. W. Walker, who thinks he procured it on some island in Bass Straits." Probably, however, Mr. Walker made a mistake.

*Haliotis nævosa*, Martyn. = *imperforata*

*Haliotis nævosa*, Martyn, Univ. Conch., 1784, vol. ii., f. 63, reproduced in Chenu's Bibliotheque Conch., Ser. 1, Tome ii., 1845, p. 23, No. 63, pl. xxii., fig. 1; Cab. Jno. Hunter, Hab. Nouv. Galles du Sud; Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), vol. ix., 1843, p. 34, No. 20, *hab.* New Zealand; Reeve, Conch. Icon., vol. iii., pl. viii., fig. 27a, pl. ix., figs. b, c; 1865, Angas, Proc. Zool. Soc., London, p. 183, No. 178, *hab.* South Australia, and 1867, p. 218, No. 203, *hab.* New South Wales; Sowerby, Thes. Conch., vol. v., 1882, p. 31, No. 59, pl. x. (437), fig. 73, *hab.* New Zealand, Van Diemen Land, and Philippines; Weinkauff, Conch. Cab. (Ed. Küster), Band. vi., Abt. I.B., 1883, p. 34, No. 25, pl. xiv., figs. 1-3; Watson, "Chall." Zool., 1886, vol. xv., p. 49, No. 1; 1890, Pilsbry, Tryon, Man. Conch., vol. xii., p. 116, pl. xi., figs. 56, 60; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 407; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 178, *hab.* Victoria.

*Haliotis clathrata*, Reeve, Conch. Icon., fig. 72; Sowerby, Thes. Conch., 1882, vol. v., pl. vi. (433), fig. 39, who says it is a synonym of *H. nævosa*, Martyn, in which Pilsbry, *loc. cit.*, con-

curs, as a juvenile, from the Philippines; Sowerby also gives *H. ruber*, Leach, and *H. sulcata*, Philippi, as synonyms.

This occurs all along the South Australian coast from the Glenelg River to St. Francis Island.

### *Haliotis conicopora*, Peron.

*Haliotis conicopora*, Peron, Voy. "Terr. Austr.", vol. ii., 1816, p. 80; Hedley, Proc. Linn. Soc., N.S.W., 1905, part 4, p. 520; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 380.

*Haliotis tubifera*, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), vol. ix., 1843, p. 24, No. 3, *hab.*, the seas of New Holland.

*Haliotis cunninghamii*, Gray, King's Survey of Australia, vol. ii., Appendix, p. 494, teste Gatliff and Gabriel, *loc. cit.*

*Haliotis granti*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902, vol. xiv. (New Series), part 2, p. 183, pl. x., and 1903, vol. xv., p. 180. *Type locality*—Victoria.

Hedley, *loc. cit.*, drew attention to Peron's name and locality, Kangaroo Island, and suggested its conspecificity with *H. tubifera*, Lamarck, and *H. granti*, Pritchard and Gatliff. I think, too that this is the shell figured by Philippi in Abbild und Beschr. Conch., p. 147, pl. iv. and v. (Gen. 2 and 3), under the name *H. navosa*, Martyns, and which, according to Preiss, came from Mistaken Island, in New Holland. It has both from the figure and description the pipe-like holes, which in profile are well shown.

From an examination of a considerable number of specimens it seems open to question whether this is not really a variety of *H. navosa*, Martyns, and though some individuals can be easily distributed in their typical species, others cannot be placed in one rather than the other. The validity of the spiral cords and of the axial corrugations, and the extent of projection of the spire above the dorsal surface, so as sometimes to show the basal angle and in other cases not, the consequent downward slope of the surface from the suture to the perforations, or even an upward slope or its rounded curve all vary considerably.

Taken all along the South Australian coastline, at Beach-port measuring 17·5 cm. by 13·5 cm.

### *Haliotis iris*, Martyn.

*Vest Scl.*

*Haliotis iris*, Martyn, Univ. Conch., vol. ii., fig. 61; Martini and Chemnitz, Conch. Cab., 1788, vol. x., p. 317, pl. 167, figs. 1612, 1613; Wood's Index Test., 1825, p. 175, No. 13, New Zealand; Gmelin, Syst. Nat., 1789, vol. vi., p. 3691, No. 19.

*H. iris*, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 23.

*H. iris*, Martyn, Deshayes, Encycl. Meth., 1830, vol. ii., p. 178; Reeve, Conch. Icon., 1846, fig. 37; Hutton, Man. New Zea-

land Moll., 1880, p. 104; *H. iris*, Gmelin, Sowerby, Thes. Conch., 1882, vol. v., p. 20. Sp. 9, pl. iii. (430), figs. 24, 25; *H. iris*, Martyn, Weinkauff, Conch. Cab., Band. vi., Abt. I.B., p. 11, Sp. 8, pl. iv., figs. 3, 4; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 110, pl. xiii., figs. 65, 66.

Lamarck correctly gives "the seas of New Zealand" as the *habitat*, Reeve gives Kangaroo Island, but Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 51, wrote: "By some unaccountable mistake it is stated to inhabit Kangaroo Island. It is well known, however, in these colonies (the Australian) to be altogether peculiar to the islands of New Zealand." It has not been taken on Kangaroo Island or on the shore of South Australia.

### *Haliotis roei*, Gray.

*Haliotis roei*, Gray, King's Voy., vol. ii., Appendix, 1827, p. 493, no locality given; Reeve, Conch. Icon., 1846, pl. iv., fig. 10; Sowerby, Thes. Conch., vol. v., 1882, p. 31, Sp. 60, pl. x. (437), figs. 77, 78; Weinkauff, Conch. Cab. (Ed. Küster), Band vi., Abt. I.B., p. 37 No. 28, pl. xv., figs. 4-6; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 117, pl. xviii., fig. 1, pl. xlvi., figs. 11-13.

*Haliotis scabricosta*, Menke, Moll. Nov. Holl. Spec., 1843, p. 31, No. 172: *Type locality*—Mistaken Island; Philippi, Abbild und Beschreib, Conch., vol. i., 1844, p. 120, No. 4, pl. i., fig. 6.

Sowerby, Pilsbry, and Weinkauff give *H. hargreavesii*, Cox, as a synonym; but Hedley denies the identity, Proc. Linn. Soc., N.S.W., 1905, vol. xxx., part 4, p. 520. The two small examples of this species which the author, Dr. Cox, gave me support Hedley's contention.

It was recorded in Adcock's Handlist of Aquatic Mollusca of South Australia, 1893, p. 9, No. 367, as *H. rugosa-plicata*, Chemn. I have Tate's specimens thus named by him, but they are typical *H. roei*.

The species is rare in South Australia, but has been taken at Encounter Bay, at Aldinga (Mr. Kimber), up to 8·2 cm. long, by 6·5 cm. broad, and at St. Francis Island.

It has not been recorded from Victoria or Tasmania, but is common in Western Australia.

Sowerby gives "New Holland" as the *habitat*; Menke "Mistaken Island," in King George Sound.

### *Haliotis cyclobates*, Peron.

*Haliotis cyclobates*, Peron, Voy. "Terr. Austr.," vol. ii., 1816, p. 80: *Type locality*—Kangaroo Island; Hedley, Proc. Linn. Soc., N.S.W., 1905, vol. xxx., part 4, p. 520; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 380.

*Haliotis excavata*, Lamarck, Anim. S. Vert., 1822, vol. vi., p. 215; 1843 (2nd Edition, Deshayes, etc.), vol. ix., p. 25, No. 4, "the seas of New Holland"; Deshayes, Encyc. Meth., 1830, vol. ciii., vers. vol. ii.., p. 179; 1841, Delessert, Recueil, p. 33, figs.

4a, 4b, "Java seas," also figs. 6a, 6b (error in text 2a, 2b), "Java seas"; Reeve, Conch. Sys., 1842, vol. ii., p. 42, pl. cl., fig. 1; Reeve, Conch. Icon., 1846, vol. iii., pl. viii., fig. 25; H. and A. Adams, Gen. Recent Moll., vol. i., p. 443 (*Padollus*); Sowerby, Thes. Conch., 1882, vol. v., p. 30. Sp. 56, pl. iii. (430), figs. 21, 26; Weinkauff, Conch. Cab., 1883 (Ed. Küster), Band. vi., Abt. 1.B., p. 39, Sp. 29, pl. xvi., figs. 1, 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 119, pl. ix., fig. 51, pl. xlvi., fig. 23; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 180, "Portsea, Port Phillip."

Dredged alive up to 15 fathoms and taken alive on the rocks at low water along the South Australian coastline in both gulfs from Yankalilla Bay to Streaky Bay, and Murat Bay in the west. I did not get it at St. Francis Island nor anywhere in Western Australia. It is recorded from Port Phillip, Victoria, but not from Tasmania. It would seem to be very localized and confined to the southern coast of Australia.

### Haliotis emmae, Gray.

*Haliotis emmae*, Gray, MSS., Brit. Mus. Cat.; Reeve, Conch. Icon., 1846, vol. iii., pl. x., fig. 29; also Elements of Conch., 1860, vol. ii., pp. 12, 13, pl. xxiii., fig. 131; Sowerby, Thes. Conch., 1882, vol. v., p. 32, Sp. 68, pl. ii. (429), fig. 16, "New Zealand"; Weinkauff, Conch. Cab. (Ed. Küster), Band. vi., Abt. 1.B., p. 56, Sp. 43, pl. xxii., figs. 1, 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 122, pl. xiv., fig. 75; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pp. 407, 447, "Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 178, "Victoria." 6

*Padollus emmae*, Gray, H. and A. Adams, Gen. Recent Moll., 1858, vol. i., p. 443.

W. Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 48, says, "*H. tricostatus*, Lam.; *H. pulcherrima*, Auct.; and our *H. costata*, are (in Reeve's Conch. Icon.) erroneously called *H. emmae*," and cited as Australian species. But *H. costata*, Swainson, is given by Pilsbry as a synonym of *H. rugosoplacata*, Chem. Again, on page 51, "I see no difference between the species figured at plate x., fig. 29 (Conch. Icon., Reeve), under the singular name of *H. emmae*, and that described by me in the Bligh Catalogue as *Haliotis carinata*. . . . Dr. Milligan has fine specimens from the Tasmanian coasts, but we do not think it also inhabits New Holland, as here stated."

It was recorded for South Australia in Adcock's Handlist of Aquatic Mollusca, 1893, p. 9, No. 372, as *H. (Padollus) carinata*, Martyn, with *emmae*, Gray, as a synonym; but this was compiled from Tate's manuscript list, and he, in the Tasmanian Census in Proc. Linn. Soc., N.S.W., 1901, pp. 407 and 447, withdrew *H. carinata* in favour of *H. emmae*.

Taken at the Glenelg River, Lacepede Bay, Edithburgh, St. Francis Island, and Le Hunte Bay, *i.e.*, the whole length of the South Australian coast where examined. It was not found in Western Australia.

Variations consist in the stoutness of the spiral cords, and especially in the prominence of the spiral ridge above the row of holes; this may be barely perceptible, or it may be so marked as to resemble *H. tricostalis*—in fact, it is open to question whether *H. emmae* is not the eastern variant of the western *H. tricostalis*.

*Haliotis tricostalis*, Lamarck. *Not Sodus*

*Haliotis tricostalis*, Lamarck, Anim. S. Vert., 1882, p. 218.

This species was recorded for South Australia in Adcock's Handlist of Aquatic Mollusca, South Australia, 1893, p. 9, No. 373, as *Haliotis (Padollus) rubicundus*, Montfort, with *tricostalis*, Lamarck; *canaliculata*, Schbt. and Wag.; *scalaris*, Leach, as synonyms. I have not taken it in South Australia, and do not know that it has been collected here. Some of our examples of *H. emmae*, Gray, approach it. Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 48, speaking of Reeve's Mon. of the genus in Conch. Icon., says, "*H. tricostatus* (meaning *tricostalis*), *H. pulcherrima*, Auct., and our *Haliotis costata*, here erroneously called *H. emmae*," evidently regarding all four as conspecific; whereas Pilsbry makes *tricostalis*, *pulcherrima*, *costata* (a synonym of *rugosoplicata*) and *emmae* four distinct species.

*Haliotis parva*, Linne. *Not Sodus.*

*Haliotis parva*, Linne,, Sys. Nat., vol. x., p. 780; Gmelin, Sys. Nat., 1789, Tome i., vol. vi., p. 3689, No. 7; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 120, pl. xiv., fig. 74; Adcock, Handlist Aquatic Moll., South Australia, 1893, p. 9, No. 374.

Adcock records it for South Australia, but no authentic specimen from our shores is known.

*Haliotis pulcherrima*, Martyn. *not Sodus*

*Haliotis pulcherrima*, Martyn, Univ. Conch., pl. lxii., Pilsbry, Tryon, Man. Conch., 1893, vol. xii., p. 124, pl. xiii., fig. 69; Adcock, Handlist Aquatic Moll., South Australia, 1893, p. 9, No. 371.

Pilsbry gives South Australia as one of its localities, and Adcock records it, but no authentic specimen from our shores is known.

*Haliotis rugoso-plicata*, Chemnitz. *not Sodus*

*Haliotis rugoso-plicata*, Chemnitz, Conch. Cab., vol. x., p. 311, figs. 1603, 1604, 1604a; Pilsbry, 1890, vol. xii., p. 110, pl. xx., figs. 12, 13.

Pilsbry gives South Australia as one of its localities, but it is unknown here. The shell listed by Adcock under this name is *H. roei*, Gray.

*beddomei*  
**Scissurella australis**, Hedley.

*Scissurella australis*, Hedley, Memoirs Austr. Mus., 1903, part 6, vol. iv., p. 329, fig. 63; Verco, Trans. Roy. Soc., S.A., vol. xxxiv., p. 115; 1911, Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92, "100 fathoms, off Cape Wiles, South Australia." 12

**Schismope atkinsoni**, Tenison-Woods.

*Scissurella atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 149; Hedley, Austr. Assoc. Adv., Sci., 1909, p. 352; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxxiv., p. 116; Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92. 11

Dredged by me in 15 to 20 fathoms off St. Francis Island, 100 fathoms off Beachport, and by Hedley in 100 fathoms off Cape Wiles. Taken also at Bunbury, Western Australia. Hedley records it from Queensland.

**Schismope pulchra**, Petterd.

*Schismope pulchra*, Petterd, Jour. of Conch., 1884, vol. iv., p. 139, No. 17; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxxiv., p. 117; Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92. 13

Dredged off St. Francis Island in 15 to 20 fathoms, 5; and by Hedley in 100 fathoms off Cape Wiles. Taken also in Western Australia.

NOTES ON THE MARINE SHELLS OF WESTERN AUSTRALIA,  
WITH DESCRIPTIONS OF NEW SPECIES.  
PART II.

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvi., 1912.]

[Read October 10, 1912.]

PLATES XV. AND XVI.

This paper is the second in the series, continued from p. 219 of vol. xxxv., 1911, and deals with the genera *Helcioniscus*, *Patella*, *Nacella*, *Acmaea*, *Phenacolepas*, *Haliotis*, and *Schismope*.

It embraces also a list of shells received from Geraldton.

*disterecmea* ***Helcioniscus illibratus*, Verco.**

*Helcioniscus illibratus*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205, pl. x., figs. 6-14; Hedley, Commonwealth of Australia, Fisheries, 1911, part 1, p. 93.

King George Sound beach, 3; Ellensbrook, 9; Yallingup, 4 (from these two localities the specimens have a more decided bluish-purple tint); Bunbury beach, 2; in 15 fathoms, 2; in 22 fathoms, 1 (about half as large again as the type); Rottnest Island, 1.

***Patella neglecta*, Gray. *not Sodus***

*Patella neglecta*, Gray, Capt. King's Survey of the Intertropical and Western Coasts of Australia, ii., Appendix, p. 492, 1827.

*P. (Scutellastra) neglecta*, Gray, Pilsbry, Man. Conch., 1891, vol. xiii., pp. 95, 96, pl. xx., figs. 41, 42, pl. lviii., figs. 40, 41.

*P. rustica*, Linn, Menke, Moll. Nov. Holl., p. 33, 1843, and Zeitschr. F. Malac., 1844, p. 62.

*Patella melanogramma*, (?) Gmelin, Sowerby, Genera of Shells, vol. i., p. 140.

*Patella zebra*, Reeve, Conch. Icon., 1854, pl. iv., figs. 7a, 7b, "Swan River."

*Locality*. — Esperance beach, few; Hopetoun, few; King George Sound, Rabbit Island, many, and up to full size between water-marks; Ellensbrook and Yallingup, many; Rottnest Island, 1.

This species does not appear to come much further east than Esperance. It was not found on St. Francis Island, nor has it been taken along the coast of South Australia.

On Rabbit Island it attains the length of 100 mm. Nearly every individual exceeding 25 mm. in length carries

one or more patelliform parasites. I thought, naturally, they were young individuals of the same species, but they proved to be always examples of what I have named and described as *Acmaea patellavecta*.

**Patella axiaerata**, n. sp. Pl. xv., figs. 3 and 4. *not Scler*

Shell small, depressed, conical, elliptical, apex somewhat antemedian, lateral margins somewhat concave, so as to be lifted off a flat surface. Apex blunt, surface smooth; colour opaque-white, numerous rays (18 in the type), golden-yellow, with darker golden axial hairlines in them. Margin simple, smooth. Spatula well marked, large, with a distinct neck and large head. Interior white, through which the yellow rays are visible.

*Dimensions.* — Length, 4·4 mm.; breadth, 3·2 mm.; height, 1·9 mm.

*Habitat.* — Type, Rottnest Island, with many others; King George Sound beach, 8 small.

*Variations.* — Some are shorter and higher, more convex in the hinder slope, more acute at the apex. The number of golden rays may be only 12 or 10, due to the fusion of two narrower into a larger one; sometimes the ray, which is at first single, becomes later double. In some examples the golden hairlines in the rays are conspicuous and numerous. The apical region inside, for a varying extent, may be of a yellowish-brown colour.

The shape of its base suggests that its usual *habitat* is the conical surface of another shell, and as this is a very common habit with *Acmaea*, it may belong to this genus. It recalls *Patella illibrata*, Verco, by its form and apex and rays. It was not taken alive.

Type is in my cabinet.

**Patella ustulata**, Reeve. *not Scler*

*Patella ustulata*, Reeve, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 206; 1907, vol. xxxi., p. 99; and 1912, vol. xxxvi., p. 182.

This was taken at Esperance Bay and King George Sound; at Ellensbrook up to 25 mm. long, by 20 mm. wide, by 7 mm. high, the largest specimen taken in the West; at Yallingup and at Bunbury, up to 18 mm. long.

They vary greatly. A common form has from 12 to 14 broad white or yellow ribs; the rest of the shell may be white or yellow or black or pinkish-brown. Some, after a moderate growth in this fashion, become wholly black.

They do not reach the size of those at Beachport, which may be 47 mm. by 40 mm.

194  
*Patellonax squamifera*  
*Patella aculeata*, Reeve.

37

*Patella aculeata*, Reeve, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 207, and 1912, vol. xxxvi., p. 182.

Taken on the beach, King George Sound, 10, the largest is only 23 mm. by 19 mm.; Ellensbrook, 3, up to 21 mm. long; Yallingup, up to 14 mm. It was not taken above Cape Naturaliste. The specimens seem to diminish in size and scaliness as they go west and north, and are not so large as the South Australian shells, which may attain 40 mm. in length.

**Patella hepatica**, Pritchard and Gatliff. *not Solus*

*Patella hepatica*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 3, p. 194; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 207.

Esperance Bay, 3, up to 17 mm. by 13 mm.; "Albany" (Dr. Torr), 20 mm. by 15 mm. by 6·5 mm.; Yallingup, 6; Bunbury, 1. This—which is probably a variant of *P. ustulata*, Reeve—is smaller than the Victorian shell, and was not taken above Geographe Bay.

*chapmani*  
**Patella stelliformis**, Reeve.

36

*Patella stelliformis*, Reeve, Conch. Sys., 1842, vol. ii., p. 15, pl. cxxxvi., fig. 3; Verco, Trans. Roy. Soc., S.A., 1912, p. 182.

Taken on the beach at Esperance Bay, 1, very large, 39 mm. long, 37 mm. wide, and 12 mm. high, and 3 small specimens, scaly, with 8 ribs, the anterior splitting early into two; at Albany, many, 1 7-ribbed, the others 8-ribbed, outside speckled brown, inside white or brownish-yellow or speckled red-brown; at Ellensbrook, very many, up to 22 mm. long and 21 mm. wide and 6·5 mm. high, mostly 8-ribbed, some 7-ribbed, others 9-ribbed, rough and speckled; on Rottnest Island, several, up to 18 mm. long and 15 mm. wide and 6·5 mm. high.

The reddish-brown specks outside may be arranged in radial series on the ribs, or scattered irregularly on the surface. Internally the spatula may be brown, but generally white. There may be a red-brown line along the groove of the ribs. No specimens of the polygonal variety, *P. chapmani*, Tenison-Woods, or of the variety *Acmea albida*, Tenison-Woods, were found. The typical forms were much more numerous and foliaceous than on the eastern shores of South Australia.

*Nucula*  
**Nucella parva**, Angas.

57

*Nucella parva*, Angas, Proc. Zool. Soc., London, 1878, p. 862, pl. liv., fig. 12; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208, 1907, vol. xxxi., p. 101, 1912, vol. xxxvi., p. 183.

Taken in King George Sound on the beach, and in 10 to 15 fathoms very many, and in 28 fathoms a few; on Bunbury beach, 3; in Geographe Bay, 15 fathoms, 2; off Fremantle, in 6 fathoms, 1. They vary greatly in width; some may be 6·75 mm. long by 2·25 mm. wide, and others 5·25 mm. long by 1·75 mm. wide, and so confirm the suggestion made in 1906 that *N. compressa*, Verco, is only a variant. They are none of them quite so wide as the South Australian examples, 5·6 mm. by 2·8 mm.; and none of them quite so narrow, 5 mm. by 1·6 mm., but are intermediate. At King George Sound they are much more common in the shallow dredging than anywhere in South Australia.

*Asteracmea*

*Nacella crebrestriata*, Verco.

*Nacella crebrestriata*, Verco, Trans. Roy. Soc. S.A., 1904, vol. xxviii., p. 144, pl. xxvi., figs. 20, 21; 1906, vol. xxx., p. 208; 1907, vol. xxxi., p. 101; and 1912, vol. xxxvi., p. 183.

King George Sound beach, 3; Yallingup, 5; Rottnest Island, 2.

49

*Asteracmea* ~~Verae~~ *roseoradiata*, var. nov.

50

This is typically a broader and more elliptical shell, has about two-thirds as many radial striæ, and 15 or 16 deep-pink axial rays, gradually increasing in width.

This was taken at Guichen Bay, South Australia; but in much better condition and more abundantly at Ellensbrook and Yallingup. Some examples are oval rather than elliptical, being narrower anteriorly; they vary somewhat in width, and one has its lateral margins incurved, as though the narrow surface—e.g., *Zostera*—on which it lived had shrunk, and consequently had led to the contraction of the sides of the aperture of the shell.

Type is in my cabinet.

*Asteracmea*

*Nacella stowæ*, Verco.

48

*Nacella stowæ*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., pl. x., figs. 4, 5; 1912, vol. xxxvi., p. 183.

King George Sound beach, 8; Bunbury beach, 4; Rottnest Island, 2. Identical with the South Australian specimens, but in poor condition.

*Acmaea patellavecta*, n. sp. Pl. xv., figs. 5-7;  
pl. xvi., fig. 5.

*not Sora*

Shell solid, elliptical, conical. Apex at the junction of the anterior and middle third, eroded. Margin in profile concave at the sides (due to its habit of living on a patella). Anterior slope nearly straight, posterior somewhat convex.

Outer surface with 40 radial, low, broad, round ribs, with linear interspaces, slightly crenulating the margin. Obsolete accremental growth-lines cross the ribs. The general colour is a sordid white, and the surface is mostly eroded. The interior is bordered with a narrow continuous band of a grey colour, articulated with 40 equidistant blackish-brown radially arranged spots, corresponding with the intercostal spaces. The spatula is well marked, bluish-white, with distinct muscle-scars rather wide in front, so as to give it a decided neck, beyond which it projects with a convex end.

The radula consists of 105 rows of teeth with the formula 2 (3.0.3.) 2, or more correctly 2 (1·1.1.0.1.1) 2. The marginals are simple, bent nearly at a right angle in the middle, with straight stems and curved cusps. The outer laterals are in line with each other, the inner of the two is only about half as wide as the other, with distinct cusps but with united bases which (though the radula may be picked to pieces) are inseparable. The inner laterals are at a higher level, and are close to each other, but their bases are quite separable. There is no central tooth. It has a triangular branchia extending from the left over the neck to the right, without any branchial cordon.

*Dimensions*.—Length, 31·5 mm.; breadth, 23 mm.; height, 14 mm.; height of the curve at the border, 2·5 mm.

*Locality*.—Type from Cape Naturaliste.

It is found also in abundance on Rabbit Island, King George Sound, and at Ellensbrook and Yallingup, south of Cape Naturaliste.

It lives on the shell of *Patella neglecta*, Gray. Nearly every example of which above 25 mm. in length carries one or more (hence its name).

*Variations*.—It may grow to the size of 41 mm. long by 32 mm. wide and 21·5 high. The ribs may increase to more than 50.

The outer surface is generally much eroded, so that the apex is absent. In one example, 18 mm. by 13 mm. by 5 mm., the top is a brown point without any sign of a spiral, ·5 mm. by ·25 mm. in size surrounded by a white area 2 mm. by 1 mm., from which project 9 primary rays. These increase rapidly by splitting and by intercalation to 23 at the margin.

The blackish markings inside the border vary with the number of ribs. They may be very distinct, but in the larger shells they fade out and may disappear altogether: sometimes in the smaller shells they may be very faint. The narrow marginal band may be so dark as to quite obscure

the spots. The colour inside varies. The inner border may be a pale heliotrope, within this an opaque white band, and then heliotrope as far as the muscle-scar. The interior may be wholly dark blotchy-brown, except the muscle-scar, which is white, and the front two-thirds of the spatula, which may be bluish-white. The brown may be more or less blotched about a whitish interior, or almost absent. In some a faint greenish-blue tint is present, deepest in the spatula.

*Diagnosis.*—Its *habitat*, on the back of living *Patella neglecta*, Gray, suggested that it might be the young of this mollusc: but it is not narrowed anteriorly, the ribs are low, round, and approximate; the apex is less eccentric, the spots inside—if present—are single, and not in couples. The dentition and branchiæ are not those of *Patella*, but of *Acmaea*.

Its other ally is *A. alticostata*, Angas, but its ribs are more numerous, lower, and more approximate than in Angas' species: it has not the intercostal curved concentric dark markings, and the internal marginal spots are disposed radially instead of laterally. The dentition of the radula separates them widely. *Vide* pl. xvi., figs. 3-5.

It closely resembles the figure of *Patella nigrosulcata*, Reeve, Conch. Icon., 1885, Sp. 84a, hab. (?), and may prove to be this species; *Patella (scutellastra) stellariformis*, Reeve, var. *nigrosulcata*, Reeve, Pilsbry, Man. Conch., 1891, vol. xiii., p. 100, pl. lxi., figs. 66, 67. Pilsbry gives no *habitat* for this variety, but for the species he gives "Japan to Port Jackson, South Australia," etc.

Though *P. stellariformis*, Reeve, is abundant, large, and typical in the localities where my shell is found, no intermediate forms were taken. The figures do not indicate a laterally concave base. If *P. stellariformis* has been proved by dissection to be a *Patella*, this cannot be a variety, because this is an *Acmaea*.

Type in my collection.

### *Patellidae* *Acmaea alticostata*, Angas.

*Patella alticostata*, Angas, Proc. Zool. Soc., London, 1865, p. 56, pl. iii., fig. 11; Verco, Trans. Roy. Soc. S.A., 1912, vol. xxxvi., p. 183.

Taken at Esperance Bay, 1 measuring 26 mm. long by 22 mm. broad and 6 mm. high, in perfect condition, has only 9 very broad, round ribs with narrow intercostal spaces, but is plainly of this species; at King George Sound, abundant, and typical up to 44 mm. by 42 mm. by 12 mm.; at Ellensbrook, 3, up to 20 mm.; at Yallingup, 3, up to 23 mm.; at Bunbury, up to 14 mm.; at Rottnest, up to 25 mm.

43

*CHIAX Acmaea conoidea*, Quoy and Gaimard. 45

*Patelloidea flammæa*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 354, pl. lxxi., figs. 15, 16; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 183.

Var. *Jacksoniensis*, Reeve (*Patella*), Conch. Icon., vol. viii., 1855, pl. xxxix., figs. 127a, 127b.

King George Sound beach, many, similar to our South Australian form, without a definite dark maltese cross, but with four white radial bands more or less irregular and indistinct. Shape mostly narrowed in front, some very much; Ellensbrook; Yallingup, many, up to 17 mm. by 13 mm. by 5·5; Bunbury; Rottnest Island, many and large, up to 25 mm. by 20 mm. by 12·5 mm.

Var. *Crucis*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 52.

King George Sound beach, up to 20 mm. by 16 mm.; Yallingup; Bunbury; Rottnest Island, up to 25 mm. by 20 mm. by 11·5 mm.

"Geraldton and Abrolhos Island" (Dr. Torr). They are identical with the South Australian examples in shape, size, and colouring.

*CHIAX Acmaea conoidea*, Quoy and Gaimard. 45

*Patelloidea conoidea*, Quoy and Gaimard, Voy. "Astrolabe," Zool., vol. iii., 1834, p. 355, pl. lxxi., figs. 5, 7; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 214.

Ellensbrook, 1, half-grown. A form was found on the rocks at the south end of Rottnest Island, the largest example being 22 mm. long, 18 mm. wide, and 12·5 mm. high; it may be 18 mm. by 13·5 mm. by 8 mm., or 15 mm. by 11 mm. by 4 mm. There may be about 16 radial, thread-like ribs, with from 2 to 5 intervening threadlets. These may be absent except for obsolete primary threads. The apex is nearly central, slightly anterior and blunt. The colour is wholly black, with a black marginal band within. The rest of the interior is white, except the apical third, which is lighter or darker brown. In some the marginal black band may be broken by a linear radial extension of the white interior to the edge at one point towards the back, or at two symmetrical points or at several, and in some specimens radial black colour-bands are visible in the interior through the white. When the shell is eroded outside some four or five white radial bands may be displayed or quite a number, or the erosion may destroy all the black outer coating and leave only white; and if the rubbing and rolling affect the margin, it reveals an irregularly articulated border of white and black. This, I think, is probably the *P. conoidea* of Quoy. Though

I sought carefully on every beach examined for his species, I could not find any shell to match his unique type specimen, and I think it is probably somewhat of a monstrosity as regards its comparative height. The lateral concavity of its borders is explained by its resting on some convex surface, while erosion has removed both sculpture and colour from its upper three-fourths. Although the shells gathered by me are so distinctive in some examples by their wholly deep-black exterior, their internal black border, and elate conical shape, I feel sure they are only a further variant of the shells taken from the same rocks which I have recorded under the name of *A. flammea*, Quoy and Gaimard, var. *jacksoniensis*, Reeve.

*Actinolacea*

*Acmaea calamus*, Crosse and Fischer.

54

*Patella calamus*, Crosse and Fischer, Journ. de Conch., 1864, p. 348, and 1865, p. 42, pl. iii., figs. 7, 8; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 184.

Var. *polyactina*, Verco. *not Sades*

Taken on King George Sound beach, 6; at Yallingup, 4; on Bunbury beach, 3; in Geographe Bay, 15 fathoms 2, in 22 fathoms 3; off Fremantle, in 6 fathoms, 2; on Rottnest Island, 3; "Cottesloe," 1; "Geraldton," 1. This variety seems to replace the typical shell in Western Australia.

*NOTOAcmaea septiformis*, Quoy and Gaimard.

56

*Patelloidea septiformis*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 362, pl. lxxi., figs. 43, 44; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 184.

King George Sound beach, up to 15 mm. long and 12 mm. wide; Ellensbrook, 3, worn; Yallingup, 1, worn; none further north.

*NOTOAcmaea subundulata*, Angas.

57

*Acmaea subundulata*, Angas, Proc. Zool. Soc., London, 1865, p. 155; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 185.

A number were taken on the beach at Esperance Bay, but none further west.

*Phenacolepas calva*, Verco.

*Scutellina calva*, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 9, 10; also op. cit., 1912, vol. xxxvi., p. 185.

210

King George Sound beach, 1; in 14 fathoms, 1.

**Phenacolepas alboradiata**, Verco.

209

(*Scutellina*) Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217;  
also *op. cit.*, 1912, vol. xxxvi., p. 185.

King George Sound beach, 1.

**Haliotis albicans**, Quoy and Gaimard.

4

*Haliotis albicante*, Quoy and Gaimard, Voy. "Astrolabe," Zool., vol. iii., pl. lxviii., figs. 1, 2.

*H. albicans*, Quoy and Gaimard, Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 185.

Taken at King George Sound, the *type locality*.

**Haliotis elegans**, Koch. ~~not Sodas~~

*Haliotis elegans*, Koch, in Philippi, Abbild und Besch. Conch., 1844, vol. i., p. 119, pl. i., figs. 1, 2; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 186.

The *type locality* is "the western shore of New Holland, very rare." It was taken on Rottnest Island.

**Haliotis conicopora**, Peron.

3

*Haliotis conicopora*, Peron, Voy. Terr. Austr., vol. ii., 1816, p. 80; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 187. Synonyms are *H. tubifera*, Lamarck, and *H. granti*, Pritchard and Gatliff.

Taken at Esperance; in King George Sound; at Ellensbrook, measuring 17·5 cm. by 13·5 cm.; and on Rottnest Island.

**Haliotis roei**, Gray.

2

*Haliotis roei*, Gray, King's Voy., vol. ii., Appendix, 1827, p. 493; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 188.

Taken at Esperance Bay, King George Sound, Ellensbrook, Bunbury, and Rottnest Island. This is by much the most common *Haliotis* in Western Australia. It may be 10 cm. long by 8·2 cm. broad. It appears to have come round from the west along the southern coast of Australia, and reached Encounter Bay.

**Haliotis tricostalis**, Lamarck.~~not Sodas~~

*Haliotis tricostalis*, Lamarck, Anim. S. Vert., 1822, p. 218; also (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 30, No. 14 "Java seas"; Deshayes, Encyc. Meth., 1830, vol. ciiii., Vers, vol. ii., p. 181, No. 12; Delessert, Recueil., 1841, pl. xxxiii., figs. 8a, 8b; Menke, Moll. Nov. Holl., 1843, p. 32, No. 177, "West coast of New Holland"; H. and A. Adams, Gen. Recent Moll., 1858, vol. i., p. 443, pl. l., fig. 7 (*Padollus*); Chenu, Man. Conch., 1859, vol. i., p. 368, figs. 2746, 2747; Weinkauff, Conch. Cab. (Ed. Küster), 1883, Band. vi., Abt. 1.B., p. 13, Sp. 10, pl. v., figs. 3, 4;

Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 123, pl. xii., pp. 84, 85; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 190.

Hedley, in Proc. Linn. Soc., N.S.W., 1906 (1905), part 4, p. 521, writes:—"Pilsbry marks Montfort's name (*i.e.*, *Haliotis rubicundus*) as doubtful, but it was recognized and accepted by Dr. J. E. Gray in King's Survey Trop. Austr., Appendix ii., 1827, p. 495, and he had unusual facilities for ascertaining the facts of the case." In May, 1907, he wrote to me privately:—"I find Bolten has a *Haliotis rubicunda*, Mus. Bolt., p. 14, No. 160, which upsets the later *H. rubicundus* of Montfort. I suppose *H. tricostalis*, Lamarck, 1822, should be called *H. scalaris*, Leach, 1814. The copy of Anim. S. Vert. in the library of the Australian Museum, Sydney, formerly belonged to Wm. Swainson. In the margin of p. 218 is a pencil note in Swainson's hand, 'This is the *Padollus scalaris* of Leach.'" Hedley's suggestion is commended to those who have the literature and material necessary to settle the question. Meanwhile I use the well-known name of Lamarck.

The species is less common than *H. roei*, Gray, but yet not rare. It was taken at Esperance, Albany, Ellensbrook, Bunbury, and Rottnest Island. The last locality provided a specimen measuring 11·5 cm. by 9·25 cm.

### Schismope atkinsoni, Tenison-Woods.

*Scissurella atkinsoni*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 149; (*Schismope*) Verco, Trans. Roy. Soc., S.A., 1912, p. 191.

Taken on Bunbury beach, 1.

### Schismope pulchra, Petterd.

*Schismope pulchra*, Petterd, Journ. of Conch., 1884, vol. iv., p. 139, No. 17; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 191.

Hopetoun beach, 2; King George Sound beach, 2.

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### A LIST OF SHELLS RECEIVED FROM GERALDTON, WESTERN AUSTRALIA.

Two or three years ago Dr. Torr brought me from Geraldton, and the Abrolhos or Houtman Islands close by, a number of shells he had collected there, and during this year Mr. Bardwell, a resident in the town, has sent me a small consignment. From this material I have prepared a list of all the species received up to the present. The two

localities are so adjacent that I have placed the species from both of them together. An asterisk has been attached to those which are found in South Australian waters, so that at a glance the proportion of species common to the two regions can be noted.

Of the 150 shells identified in this list, 108 are found in South Australia. Of the 12 shells not named, 4 are almost certainly found there, and possibly three others, or 112 probably, and 115 possibly among 162; that is, 71 per cent. These are, of course, the most common shells, and if the same ratio holds with the rare species, nearly three-fourths of the marine mollusca will be common to the two far distant localities. The proportion of 71 per cent. applies to the Pelecypods and to the Gasteropods alike.

- \**Spirula spirula*, Linne, 1758, *Nautilus*.
- Cadulus occiduus*, Verco, 1912.
- Cryptoplax*, sp.
- Patella neglecta*, Gray, 1827.
- \**Nacella parva*, Angas, 1878.
- \**Acmæa alticostata*, Angas, 1865, *Patella*.
- \**Acmæa septiformis*, 1834, *Patelloidea*.
- \**Acmæa crucis*, Tenison-Woods, 1877.
- \**Acmæa polyactina*, Verco, 1912.
- Acmæa patella-vecta*, Verco, 1912.
- \**Haliotis roei*, Gray, 1827.
- \**Megatebennus omicron*, Crosse and Fischer, 1864, *Fissurella*.
- \**Macroschisma tasmaniæ*, Sowerby, 1866.
- \**Gena nigra*, Quoy and Gaimard, 1834, *Stomatella*.
- \**Turbo jourdani*, Kiener, 1839.
- \**Turbo stamineus*, Martyn, 1784, *Limax*.
- Turbo pulcher*, Reeve, 1842.
- Turbo ticaonicus*, Reeve, 1842.
- \**Astralium fimbriatum*, Lamarck, 1822, *Trochus*.
- Astraliumstellare*, Gmelin.
- \**Phasianella australis*, Gmelin.
- \**Phasianella ventricosa*, Quoy and Gaimard, 1834.
- \**Phasianella variegata*, Lamarck, 1822.
- \**Phasianella rosea*, Angas, 1867, *Eutropia*.
- Phasianella*, sp.
- \**Cyclostrema tatei*, Angas, 1878.
- Trochus obeliscus*, Gmelin.
- \**Clanculus plebeius*, Philippi, 1846, *Trochus*.
- \**Monodonta melanoma*, Menke, 1843.
- Monodonta (Chlorodiloma) zeus*, Fischer, 1874, *Trochus*.
- \**Cantharidus lehmanni*, Menke, 1843, *Trochus*.

- \**Cantharidus pulcherrimus*, *Wood*, 1828, *Trochus*.
- \**Thalotia conica*, *Gray*, 1827, *Monodonta*.
- \**Thalotia chlorostoma*, *Menke*, 1843, *Trochus*.
- \**Thalotia neglecta*, *Tate*, 1893.
- Thalotia indistincta*, *Wood*, 1828, *Trochus*.
- \**Phasianotrochus irisodontes*, *Quoy and Gaimard*, 1834,  
    *Trochus*.
- \**Leiopyrga octona*, *Tate*, 1891.
- \**Euchelus baccatus*, *Menke*, 1843, *Monodonta*.
- \**Euchelus ampullus*, *Tate*, 1893.  
    *Nerita undata*, *Linne*.  
    *Nerita polita*, *Linne*, var. *antiquata*, *Recluz*, 1841.
- \**Syrnola tincta*, *Angas*, 1871.
- \**Odostomia simplex*, *Angas*, 1871.
- \**Odostomia pupæformis*, *Sowerby*, 1865.
- \**Odostomia vincentina*, *Tryon*, 1886.
- \**Oscilla tasmanica*, *Tenison-Woods*, 1877 (1876), *Parthenia*.
- \**Turbonilla hofmani*, *Angas*, 1867.
- \**Turbonilla fusca*, *A. Adams*, 1855, *Chemnitzia*.
- \**Cingulina spina*, *Crosse and Fischer*, 1864, *Turritella*.
- \**Scala aculeata*, *Sowerby*, 1844, *Scalaria*.
- \**Scala jukesiana*, *Forbes*, 1852, *Scalaria*.
- \**Crossea labiata*, *Tenison-Woods*, 1876 (1875).
- \**Litorina mauritiana*, *Lamarck*, 1822, *Phasianella*.  
    *Tectarius rugosus*, *Menke*, 1843, *Littorina*.  
    *Planaxis sulcatus*, *Born*, 1778, *Buccinum*.  
    *Modulus disculus*, *Philippi*, 1846.
- \**Risella melanostoma*, *Gmelin*, 1789, *Trochus*.
- \**Diala monile*, *A. Adams*, 1862, *Alaba*.
- \**Diala lauta*, *A. Adams*, 1864, *Alaba*.
- \**Capulus conicus*, *Schuhmacher*, 1817, *Amalthea*.
- \**Capulus antiquatus*, *Linne*.  
    *Crepidula aculeata*, *Gmelin*, *Patella*.
- \**Ianthina violacea*, *Bolten*.
- \**Natica collei*, *Recluz*, 1843.
- \**Polinices conica*, *Lamarck*, 1822, *Natica*.
- \**Eunaticina papilla*, *Gmelin*, *Sigaretus*.
- \**Truncatella scalarina*, *Cox*, 1868.
- \**Truncatella marginata*, *Küster*.
- \**Rissoa (Setia) nitens*, *Frauenfeld*, 1867, *Setia*.  
    *Rissoa*, sp.  
    *Rissoa*, sp.  
    *Rissoa*, sp.  
    *Rissoa*, sp.  
    *Rissoa*, sp.  
    *Rissoa*, sp.

- \*Rissoa (*Epigrus*) petterdi, *Brazier*, 1894, Rissoa.
- \*Rissoina flexuosa, *Gould*, 1861.
- \*Vermicularia siphon, *Lamarck*, 1818, Serpula.
- \*Siliquaria weldii, *Tenison-Woods*, 1876, Tenagodus.
- \*Bittium granarium, *Kiener*, 1842, Cerithium.
- \*Cerithium icarus, *Bayle*, 1880.
- Cerithium cordigerum, *Bayle*, 1880.
- \*Triphora granifera, *Brazier*, 1894.
- \*Plesiotrochus monachus, *Crosse and Fischer*, 1864, Cerithium.
- Campanile lave, *Quoy*, 1834, Cerithium.
- Strombus floridus, *Lamarck*, 1822.
- Bursa anceps, *Lamarck*, Ranella.
- Cypræa caput-serpentis, *Linne*.
- Cypræa carneola, *Linne*.
- Tonna variegata, *Lamarck*, 1822, Dolium.
- \*Cymatium exaratum, *Reeve*, 1844, Triton.
- \*Pyrene versicolor, *Sowerby*, 1832, Columbella.
- \*Pyrene semiconvexa, *Lamarck*, 1822, Buccinum.
- \*Pyrene austrina, *Gaskoin*, 1851, Columbella.
- \*Pyrene atkinsoni, *Tenison-Woods*, 1876, Drillia.
- Cantharus undosus, *Linne*, 1758, Buccinum.
- \*Arcularia pauperata, *Lamarck*, 1822, Buccinum.
- Arcularia glans, *Linne*, 1758, Buccinum.
- Arcularia dorsata, *Bolton*, Buccinum.
- Thais hippocastanea, *Linne*, 1758, Murex.
- Thais succincta, *Martyn*, 1784, Buccinum.
- \* var. textiliosa, *Lamarck*, 1822.
- \* var. ægrotia, *Reeve*.
- Thais lineata (?), *Lamarck*.
- Drupa chaidea (?), *Duclos*, 1832, Purpura.
- Drupa margariticola, *Broderip*, 1832, Murex.
- Megalatractus aruanus, *Linne*, 1758, Murex.
- \*Marginella angasi, *Brazier*, 1870.
- Mitra.
- \*Cymbium flammeeum, *Bolten*, 1798, var. miltonis, *Gray*,
- \*Oliva australis, *Duclos*, 1835.
- \*Clathurella rufozonata, *Angas*, 1877.
- \*Cythara kingensis (?), *Petterd*, 1879, Daphnella.
- \*Conus anemone, *Lamarck*, 1810.
- Conus miliaris, *Hwass*.
- \*Bulla australis, *Gray*, 1825.
- Hydatina physis, *Linne*, 1758, Bulla.
- \*Tornatina fusiformis, *A. Adams*, 1854, Bulla.
- \*Retusa, sp.
- \*Atys exigua (?), *A. Adams*, 1854.
- \*Siphonaria baconi, *Reeve*, 1856.

- \**Siphonaria stowæ*, *Verco*, 1906.
- Siphonaria*, sp.
- \**Nucula micans*, *Angas*, 1878.
- \**Arca navicularis*, *Bruguiere*, 1797.
- \**Barbatia domingensis*, *Lamarck*, 1822, *Arca*.
- \**Glycimeris radians*, *Lamarck*, 1819, *Pectunculus*.
- \**Meleagrina fimbriata*, *Dunker*, 1852, *Avicula*.  
*Vulsella vulsellæ*, *Linne*.  
*Septifer bilocularis*, *Linne*, 1756, *Mytilus*.
- \**Brachydontes erosus*, *Lamarck*, 1819, *Mytilus*.
- \**Modiolaria paulueciæ*, *Crosse*, 1863, *Crenella*.
- \**Cardita crassicosta*, *Lamarck*, 1819.  
*Cardita incrassata*, *Sowerby*, 1825.
- \**Chama spinosa*, *Broderip*.  
*Chama fimbriata*, *Reeve*, or *ruderale*, *Lamarck*.
- \**Lucina tatei*, *Angas*, 1878.
- \**Loripes icterica*, *Reeve*, 1850.
- \**Thyasira globosa*, *Forskal*.
- \**Lasea scalaris*, *Philippi*, 1847, *Poronia*.  
*Lepton*, sp.
- \**Rochefortia donaciformis*, *Angas*, 1877, *Mysella*.
- \**Cardium elongatum*, *Bruguiere*.
- \**Cardium erugatum*, *Tate*, 1888.  
*Cardium*, sp.  
*Codakia interrupta*, *Lamarck*, 1818, *Cytherea*.
- \**Sunetta excavata*, *Hanley*, 1842, *Cytherea*.  
*Chione marica*, *Linne*, *Venus*.
- \**Chione undulosa*, *Lamarck*, 1818, *Venus*.  
*Gafrarium australe*, *Sowerby*, 1851, *Circe*.
- \**Gafrarium angasi*, *E. A. Smith*, 1885, *Circe*.
- \**Venerupis crenata* (?), *Lamarck*, 1818.
- \**Petricola lapicida*, *Chemnitz*, *Venus*.
- \**Tellina albinella*, *Lamarck*, 1818.  
*Tellina perna*, *Spengler*.
- \**Tellina decussata*, *Lamarck*, 1815.
- \**Donax brazieri*, *E. A. Smith*, 1891.  
*Donax columbella*, *Lamarck*.  
*Donax sulcarius*, *Menke*.
- \**Saxicava arctica*, *Linne*, 1767, *Mya*.
- \**Pholas australasiæ*, *Sowerby*, 1849.

**SHELLS FROM THE GREAT AUSTRALIAN BIGHT.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xxxvi., 1912.]

[Read October 10, 1912.]

**PLATES X. TO XIV. AND XVI.**

In March, 1912, the Federal Minister of Trade and Customs granted me permission to go on the trawler "Endeavour" during a trip of investigation in the Bight.

The area covered extended from 30 to 120 miles west of the longitude of Eucla, along the 100-fathom line, the trawl being taken across this line from 75 fathoms to 120 fathoms. The 100-fathom line followed the curve of the coast fairly uniformly at a distance of about 60 miles. The shells obtained were those brought up incidentally in the large trawl when this was gathering fish. As its mesh was comparatively large, very few small shells were taken. The fauna was consequently quite different from that I have dredged off the South Australian coast in deep water before, when either a very fine-meshed net-dredge or a conical iron bucket-dredge has been used, and only smaller forms have been obtained. Mr. Dannevig, the Director of the Fisheries investigation, very kindly gave me two hauls with my bucket-dredge in deep water, and so supplied me with material for comparison with what I have taken in a similar manner and at equal depths elsewhere.

I am pleased to take this opportunity of expressing my thanks to the Ministerial heads of the Department in the Commonwealth and in the State for the opportunity of securing much interesting material, and also to the officers and men on the trawler for their very ready and interested help.

In this paper, owing to lack of time, I am only able to deal with the larger Gasteropods. I hope to deal with the smaller forms and with the Pelecypods in the future.

***Phasianella australis*, Gmelin.**

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*Buccinum australe*, Gmelin, Sys. Nat., 1788, p. 3490, No. 173.

One large specimen, dead, in poor condition, dredged in 100 fathoms 90 miles west of Eucla.

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**Clanculus leucomphalus, Verco.**

*Clanculus leucomphalus*, Verco, Trans. Roy. Soc., S.A., 1905, vol. xxix., p. 168, pl. xxxi., figs. 9-11.

One example was taken alive in 72 fathoms 40 miles west of Eucla, rather larger than the type, being 85 mm. high and 12 mm. in diameter.

**Calliostoma hedleyi, Pritchard and Gatliff.**

*Calliostoma hedleyi*, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902 (1901), vol. xiv. (New Series), part 2, p. 182, pl. ix., fig. 4: Type locality—Western Port (Gatliff); also *op. cit.*, 1906 (1905), vol. xviii. (New Series), part 2, p. 65; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 109. "100 fathoms, off Cape Pillar, Tasmania."

One example, taken in 80 fathoms 80 miles west of Eucla.

*Leacouypha crepidula immersa*. Angas.

*Crepidula immersa*, Angas, Proc. Zool. Soc., London, 1865, p. 57, pl. ii., fig. 12: Type locality—"Port Lincoln, South Australia"; also p. 174, No. 118; Watson, 1886, "Chall.," Zool., vol. xv., p. 460, No. 4, "Bass Strait"; Tryon, Man. Conch., 1886, vol. viii., as a synonym of *C. onyx*, Sowerby, p. 128, pl. xxxviii., figs. 46, 47; J. B. Wilson, 1887, Vict. Nat., p. 116, "Port Phillip, Victoria"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii., p. 201; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 377, as a synonym of *C. unguiformis*, Lamarck, Tasmania; also p. 445.

Taken in 75 fathoms 80 miles west of Eucla, up to 44.5 mm. in length, 3 quite fresh.

**Caledoniella contusiformis, Basedow.**

*Caledoniella contusiformis*, Basedow, Trans. Roy. Soc., S.A., vol. xxix., 1905, p. 183, pl. xxviii., fig. 1: var. *pulchra*, pl. xxviii., fig. 3.

Taken in 72 to 88 fathoms, 1, *C. pulchra*; in 88 to 100 fathoms, very many; in 100 fathoms, very many; in 96 to 84 fathoms, 12 specimens; and in 95 to 120 fathoms, very many. The trawling extended from 40 miles to 120 miles west of the longitude of Eucla. The examples were so numerous that we kept as many as we thought we might want and threw the rest overboard with the rubbish. They seemed to be most plentiful when large masses of green, sponge-like material were brought up. They were of varying sizes, but attained larger dimensions than the type, the shell reaching a maximum of 37 mm. long by 29 mm. wide. We did not secure a single specimen of the other varieties of this species, such as *testudinis* or *labyrinthina*, nor of the typical *contusiformis*, though variations in colour-marking were found in *C. pulchra*. Some had just the same colouration as

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1481

the example figured, the shield "of a rich yellow ground-colour, with large circular or oval lighter blotches surrounded by wreaths of black." A very large number were altogether destitute of the black wreaths, and had pale-yellow areas on the darker-yellow ground. Others had opalescent-white spots instead of the pale-yellow, and others again had yellow spots on an opalescent-white ground.

Balch, of Boston, Massachusetts, in a paper on a new Labradorean species of *Onchidiopsis*, in the Proc. U.S. Nat. Mus., vol. xxxviii., No. 1761, p. 469, places *Caledoniella* in the subfamily *Velutinina*, of the family *Lamellariidae*; but in order to locate the genus definitely in its subfamily it is necessary to determine whether the animal has the sexes separate or united, and whether it has an expiratory cleft.

### *Turritella runcinata*, Watson.

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*Turritella runcinata*, Watson, Jour. Linn. Soc., vol. xv., 1881, p. 217; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxiv., p. 122.

Taken in 50 fathoms west of Eucla, 2; 75 fathoms 80 miles west of Eucla, 3; 80 fathoms 80 miles west of Eucla, 4; 101 fathoms 80 miles west of Eucla, 1. It may reach 64 mm. in length by 17 mm. in width. They were all dead.

### *Vermicularia flava*, Verco.

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*Vermicularia flava*, Verco, Trans. Roy. Soc., S.A., 1907, vol. xxxi., p. 214, fig. 1; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 376, "Western Port"; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 111, "100 fathoms, off Cape Pillar, Tasmania"; Hedley, Commonwealth of Australia, Fisheries, 1911, part 1, p. 93, "100 fathoms, off Cape Wiles."

Taken in 80 fathoms 80 miles west of Eucla, alive; in 100 fathoms 90 miles west of Eucla.

### *Siliquaria australis*, Quoy and Gaimard.

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*Siliquaria australis*, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 302; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 378, recorded for Tasmania; Menke, Moll. Nov. Holl., p. 10, No. 28, recorded for Western Australia; Angas, Proc. Zool. Soc., 1865, p. 174 (*Tenagodes*), recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 204, recorded for Victoria.

Dredged alive in large masses of yellow sponge in 80 fathoms 80 miles west of Eucla, and in 75 fathoms; in 100 fathoms 90 miles west of Eucla, and in 72 fathoms 40 miles west of Eucla.

**Siliquaria weldii**, Tenison-Woods.

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*Tenagodus weldii*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 144, "East coast, Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 205 (*Tenagodes*), "Port Phillip, Western Port"; May, Proc. Roy. Soc., Tasmania, 1902, p. 110, "Type in Tas. Mus., Hobart."

*Siliquaria (Pyxipoma)*, Tryon, Man. Conch., 1886, vol. viii., p. 191, pl. lviii., fig. 28; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 378; Hedley, Records Austr. Mus., 1905, vol. vi., part 2, p. 42, "111 fathoms, off Cape Byron, New South Wales"; Hedley and May, *op. cit.*, 1908, vol. vii., No. 2, p. 111, "100 fathoms, off Cape Pillar."

Taken in 100 fathoms 90 miles west of Eucla, in sponge.

**Siliquaria anguina**, Linnaeus.

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*Tenagodus anguinus*, Linnaeus, Mus. Lud. Ulr., 701, No. 431, 1758.

*Serpula anguina*, Born, Mus. Caes. Vindobon., Test., Tome 18, fig. 15; Gmelin, Sys. Nat. Linn., 1789, vol. vi., p. 3743, "Indian Ocean."

*Siliquaria anguina*, Chenu, Illus. Conch., p. 1, pl. i., figs. 1, 2; Reeve, Conch. Icon., pl. iii., Sp. 7, figs. 7a, 7b, 7c, 7d, 7e; Tryon, Man. Conch., 1886, vol. viii., p. 190, pl. lviii., figs. 23-25; Sowerby, Thes. Conch., vol. v., 1887, p. 165, No. 13, pl. 481 (*Siliquaria* ii.), figs. 11-13.

*Serpula muricata*, Born, Mus. Caes. Vindobon., Test., Tome 18, fig. 16.

*Siliquaria muricata*, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1838, vol. vi., p. 584, "Indian seas"; Chenu, Illus. Conch., p. 2, pl. ii., figs. 13, 14, "Indian seas and New Holland."

Gmelin, Reeve, Tryon, and Sowerby give *S. muricata* as a synonym of *S. anguina*.

Taken in 100 fathoms 90 miles west of Eucla, several, in a piece of blackish-purple sponge, which stains them somewhat violet. It has the *S. muricata* form, and is easily distinguished from our other two southern Australian species *S. australis* and *S. weldii* by its squamate longitudinal ribs.

**Zoila Cypraea thersites**, Gaskoin.

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*Cypraea (Aricia) thersites*, Gaskoin, Proc. Zool. Soc., 1848, p. 90; Type locality—"Salt Creek, Yorke Peninsula, South Australia, on clusters of Zoophytes at 2 to 3 fathoms."

Dredged alive in 72 fathoms 60 miles west of Eucla, 1; in 100 fathoms 90 miles west of Eucla, 1; in 75 to 120 fathoms 40 miles west of Eucla, 2. This species has hitherto appeared to be of an exceedingly limited habitat, being taken only in Gulf St. Vincent and Spencer Gulf. Once I dredged a large living specimen at the mouth of the American Inlet, off Hog Bay, Kangaroo Island. But it has not been recorded

from Victoria, Tasmania, or Western Australia. To meet it in about 100 fathoms in the Great Australian Bight was a surprise. The specimens obtained were all comparatively young. Their outer lip was formed and toothed, and the base was flattened. The youngest is nearly white, with a faint bluish-grey tint, and has two broad darker bands running across the shell from one lateral margin to the other. There are about 25 brown spots on the right margin and 10 on the left. The next more mature specimen has a flatter base, which projects more at both ends, which are faintly tinted with orange; the ground-colour is more bluey-grey, and numerous transverse interrupted streaks of brown cross the shell, more marked on the left side; numerous smaller spots are superadded to those on the right border. The third example is nearly mature, is of a still darker bluish-grey, with much more numerous and darker and larger blackish-purple spots on both margins, especially the left, and with darker brown dashes on the dorsum arranged antero-posteriorly. They differ from specimens found in our gulfs in their much lighter colour. The latter, even when much less mature, long before they show any sign of a formed lip, are of a yellow-orange colour, and are abundantly covered with dark-rusty-brown spots and blotches. The pallor of the deep-sea examples is very striking.

*Astrocypraea reevei*, Gray.

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*Cypraea reevei*, Gray, Sowerby, Conch. Illus., 1832, Cypraidæ, p. 2, No. 15\*, fig. 52: Type locality—Garden Island, mouth of the Swan River"; Menke, 1843, Moll. Nov. Holl., p. 29; Tryon, Man. Conch., 1885, vol. vii., p. 166, pl. iii., figs. 24, 25.

Taken in 100 fathoms 90 miles west of Eucla, 5 alive; in 105 fathoms 30 miles west of Eucla, 1 alive. This species is taken in King George Sound on rocks at low tides alive, and it is found alive in 100 fathoms. Most of the examples taken are more pallid than those in-shore, but there are the same pink tips and spire and obsolete transverse darker bands. It seems to have come round from the west, and to have reached South Australia, where it is known to extend as far as Backstairs Passage. From Victoria and Tasmania it is unrecorded.

*Cypraea pulicaria*, Reeve. *not Scleræ*

*Cypraea pulicaria*, Reeve, Proc. Zool. Soc., 1845, hub. (?); Conch. Icon., 1846, Sp. 84, pl. xvii., fig. 84; Tryon, Man. Conch., 1885, vol. vii., p. 189, pl. xvi., figs. 59, 60.

Taken in 80 fathoms 80 miles west of Eucla, 1 alive; in 100 fathoms 80 miles west, 3 alive; in 100 fathoms 90 miles west, 6 alive. They vary from 17 mm. to 24 mm. in

length, are of a greyish-yellowish or yellowish-brown colour. There may be no dots whatever, or only a few brown dots about the right border, or many scattered all over the surface irregularly, or some of these may be arranged in three transverse rows, or besides other scattered sparse dots, there may be two or three obscure transverse bands of brown blotches. They are narrower and more cylindrical than the *C. piperata*, Solander, though probably only a variant.

**Cypraea umbilicata**, Sowerby; var. **armeniaca**, *n. v.* *not Sobus*  
Pl. x., figs. 1-3.

1825, *Cypraea umbilicata*, Sowerby, G. B., Catalogue of Shells in collection of Earl of Tankerville, Appendix, p. xxx., No. 2260, pl. iv. and v.: *Type locality unknown.*

1826, *Cypraea umbilicata*, Sowerby, G. B., Zool. Jour., 1826, vol. ii., p. 494.

1828, Wood, Supp. Index, Test., 1828, p. 9, pl. iii., fig. 13, *hab. unknown.*

1828, *Cypraea umbilicata*, Sowerby, Gray, Zool. Jour., vol. iv., p. 77, and Sowerby, G. B., p. 221.

1837, *Cypraea pantherina*, Solander MSS., var. *umbilicata*, Sowerby, Conch. Illus. *Cypraea*, p. 2, No. 5, fig. 169.

1844, *Cypraea tigrina*, Lamarck, Deshayes, Anim. S. Vert. (2nd Edition, Deshayes, etc.), vol. x., p. 504.

1845, *Cypraea pantherina*, Lamarck, Reeve, Conch. Icon., pl. iii., Sp. 7.

1848, *Cypravula umbilicata*, Sowerby, Gray, Proc. Zool. Soc., London, pp. 124, 125.

1867, *Cypravula umbilicata*, Sowerby, Angas, Proc. Zool. Soc., London, p. 205.

1872, *Cypravula umbilicata*, Sowerby, Brazier, Proc. Zool. Soc., London, 1872, p. 86.

1880, *Cypraea umbilicata*, Sowerby, Cox, Proc. Linn. Soc., N.S.W., 1879, p. 386.

1880, *Cypraea umbilicata*, Sowerby, Thes. Conch., vol. iv., p. 21, Sp. 61, pl. viii., figs. 42-44.

1883, *Luponia umbilicata*, Sowerby, Brazier, Proc. Linn. Soc., N.S.W., vol. vii., p. 117.

1885, *Cypraea umbilicata*, Sowerby, Tryon, Man. Conch., vol. viii., p. 181.

1898, *Cypraea umbilicata*, Sowerby, Beddome, Proc. Linn. Soc., N.S.W., vol. xxii., 1897, pp. 564-568, pl. xx., figs. 1, 2.

1900, *Cypraea umbilicata*, Sowerby, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, vol. xii. (New Series), part 2, p. 187.

1901, *Cypravula umbilicata*, Sowerby, Tate and May, Proc. Linn. Soc., N.S.W., vol. xxvi., 1901, p. 374.

**Cypraea umbilicata**, Sowerby *not Sobus*

This species was erected upon a shell in the collection of the Earl of Tankerville, and was described and figured in

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*CYPRaea ARDENNICA*

the Appendix to the Sale Catalogue of the Earl's collection by G. B. Sowerby, F.L.S., in 1825. Only two specimens were known—the type and one in the cabinet of Mr. Sowerby. The type came into the possession of the British Museum. Its *habitat* was unknown. He remarked its resemblance to *C. tigris*, but in the Zoological Journal of 1826 indicated its diagnostics.

The name *C. umbilicata* had been previously attached to a shell by Solander, which Gray thinks was *C. pyrum*; but as Solander's name was only in manuscript, and was never published, Sowerby's specific name stands.

In 1828 Dr. Gray discussed it, and suggested that as only one specimen was known it might be merely a monstrosity, a deformed *C. tigris*; but if a good species, it should be placed in his newly created genus *Cyprovula*.

G. B. Sowerby replied that two specimens were known which were quite alike; this supported the probability of its being a good species, allied rather to *C. pantherina* than to *C. tigris*.

In 1837, however, Mr. Sowerby, in his Conchological Illustrations, registered his species as a variety of *C. pantherina*, Solander MSS., having evidently accepted the suggestion that it was only a variant or a monstrosity of this variable and well-known shell.

Deshayes, in his 2nd Edition of Lamarck's Anim. S. Vert., 1844, enters it among the synonyms of *C. tigrina*, Lamarck; and Reeve, in his Conch. Icon. of 1845, under *C. pantherina*, Lamarck, says "*C. umbilicata* has been acknowledged a monstrosity."

This degradation of the species to the position of a monstrosity was doubtless due to the peculiar deformed appearance of the shell and to the fact that for more than twenty years no other specimens had been found and its *habitat* was still unknown. But in 1848 Mr. Roland Gunn wrote to Dr. Gray about a collection of cowries he had found on "the east shore of Barren Island, one of Hunter's islands, north-west of Van Diemen Land," and he sent one fine specimen to the British Museum. This Dr. Gray recognized as *C. umbilicata*, Sowerby, and placed definitely among his *Cyprovula* as "the giant of the genus," removed the reproach of monstrosity from it, and established it as a true and very remarkable species, the home of which had at last been discovered. It immediately leaped into notoriety and became valuable, for the second specimen sent to England by Mr. Gunn realized the handsome sum of £30; whereas in my Tankerville Catalogue, in which have been written the prices

paid at the sale of his shells, the sum of £3 3s. is entered against *C. umbilicata*, Sowerby.

Angas in 1867 recorded the dredging, in deep water 2 miles off the coast of New South Wales, a little south of Wollongong, of several living specimens, somewhat smaller and paler in colour than the ordinary Tasmanian examples.

Sowerby in his Thesaurus gives figures of Miss Saul's specimen, which is possibly the before-mentioned individual, offered to her by Mr. Gunn for £30, and which subsequently realized that sum: and also of one of those mentioned by Mr. Angas as being dredged by Admiral Loring off Wollongong.

Dr. Cox in 1880 created a variety, *alba*, for a shell obtained at Circular Head, Tasmania, pure white, and quite devoid of all the usual characteristic spots and colouration.

John Brazier in 1883 recorded typical examples found by Mr. Bailey at Cape Schanck and Portland, on the Victorian coast.

C. E. Beddome, in an exhaustive note, refers to an individual found by Dr. A. E. Cox at Port Stephens, New South Wales, only  $2\frac{1}{2}$  in. long, lighter in colour than the Tasmanian shells, covered with light chestnut spots, base white, but not so highly enamelled as the southern forms found here (in Tasmania). He reproduces it (fig. 2, pl. xx.).

When out in the Federal trawler "Endeavour" in March, 1912, three large cowries, with a deep umbilicus, were obtained. Two of them were immature and very slightly coloured, but the third was mature, and resembled somewhat *Cypraea umbilicata*, Sowerby. I have regarded it as a variety of this species, and named it *Cypraea armeniaca* (from *armeniaca*, an apricot), because of the beautiful apricot-yellow colour of its base. Should other examples be found and establish its right to a specific distinction its name will stand, as I know of no other species so called.

### *Cypraea umbilicata*, Sowerby; var. *armeniaca*, n. v. *not* *Yoldia*

Shell solid, globular, very smooth and glazed. It has a well-marked umbilicus in which the volutions are plain; obsolete, narrow, flat, spiral bands occur on the right side of the dorsum. The base is convex. The aperture moderately wide, slightly dilated anteriorly, and then narrowing into a canal 8 mm. long; posteriorly very curved round the posterior part of the whorl and turning up behind and ending in a well-marked notch. The outer lip is bent in at a right angle, slightly convexly flattened, thick, with 38 rather small teeth,

almost confined to the inner edge. The teeth along the inner-margin are 29, narrow and very short, ending rather abruptly at their inner ends and rapidly becoming obsolete at their outer. The base is prolonged, thickened, and expanded on each side in front, especially on the left, and also at the back, where there is a considerable thickening round the notch, which is projected by it 8 mm. from the umbilicus, and some distance to the left of the centre of the spire.

The colour is whitish, but except along the line of union of the mantle-folds and just above the margins the white is obscured by clouds and blotches of light yellowish-brown and scattered chestnut spots, an irregular line of which bounds the upper edge of the right mantle lobe. The top of the anterior beak is painted blackish-brown, as is also the right side of the callus of the outer lip behind at its junction with the body-whorl. The whole of the base and outer lip is of a rich apricot colour, deepest outside the columellar teeth, which it tinges, and on the callus forming the anterior and posterior projections of the inner lip; it extends to both lateral margins and covers the dorsal surface of the anterior beak and the callus round the posterior notch. The left side of the body-whorl is of a delicate faint lilac tint, which fades insensibly into the yellow, white, and chestnut around. The interior is a creamy-white.

The animal is white, but the margin of its mouth is of a deep apricot colour, as is also the somewhat expanded semi-circular anterior end of the foot. The tentacles, about half an inch long, are of a paler tint, and so are their bases, which are about one-third as long and twice as stout, and bear the black eyes on their summits, outside the tentacles.

*Dimensions*.—Length, 3·9 in.: breadth, 2·5 in.; height, 2·2 in.

*Locality*.—100 fathoms, Great Australian Bight, 60 miles from shore, 80 miles west of Eucla, with 2 immature shells. The trawl worked over the sea bottom from 75 to 120 fathoms, so that they might have come from any intermediate depth.

The youngest example, taken at 80 fathoms in the Great Australian Bight 80 miles west of Eucla, is light and papery. It is 3 in. long by 2·2 in. wide and 1·9 in. high. Its outer lip is formed and bent in, and has 33 teeth, and there are 28 on the inner side of the aperture. The posterior notch touches the last whorl in the sunken spire, the anterior canal is smooth for 6 mm. beyond the teeth. There are faint axial growth-lines and numerous spiral flat bands. The ground-colour is white with a spiral disposition of brown smudges and streaks, which on the left side of the shell are united by a lighter

general brownish colouring. The base is of a faint apricot tint, which also tinges the columellar teeth. Near the base is a band of deep brown spots of varying size, which are found also on the base of the body-whorl; the anterior end and the lower third of the depressed spire and the adjacent part of the outer lip are of a dark walnut-brown.

A slightly older specimen, from 100 fathoms, is 3·5 in. long, 2·5 in. wide, and 2·2 in. high, has fewer brown spirals, with 36 outer and 26 inner and 4 intermediate teeth, the outer lip is rather more thickened, and the flat dorsal spirals are slightly more conspicuous.

I have had five examples of the Tasmanian form to compare it with, as well as the figures given by all the above-mentioned authors. Mine differs in shape, being more globular, higher, and wider, not only relatively, but absolutely. Mr. May kindly lent me two very diverse examples, which respectively measured 4·4, 2·3, 1·9 in. and 3·4, 2·1, 1·8 in. in length, breadth, and height, whereas mine is 3·9, 2·5, 2·2 in. Allowing, therefore, for the greater length of the anterior and posterior prolongations in Mr. May's large specimen, which is probably a senile change, mine is still more globular. It is interesting to notice the greater similarity between my specimen and the type, whose dimensions are: Length, 3·8 in.; and breadth, 2·3 in., which is different from that of most specimens. Sowerby does not give the height of his shell, nor a figure in profile, and it is difficult to estimate this from his figure, but it seems less elevated than mine. The concave depression on the under-surface of the forward projection is much less in mine, and the posterior curve of the aperture, its upward bending and the twist to the left are more marked. The colour is very different. The fairly uniform peppering with dark spots, the white base, the brown wide blotch over the middle third of the base of the body-whorl are wanting in mine, while the apricot base and the lilac side are absent from the typical shells.

It may be that the shape is due to its *habitat* in the quiet waters of 100 fathoms, and that though mature it is not senile, and its colouring to its having been taken alive instead of being washed up and partially bleached on the shore. But we will hope other specimens may be secured which will determine its right to be called a good species.

Type in my collection.

*Ellatrina - nebulosa*  
*Trivia australis*, Lamarck.

522

*Cypraea australis*, Lamarck, Anim. S. Vert., 1822, vol. vii., p. 404, and 1844 (Edition Deshayes), vol. x., p. 545, "The seas of New Holland" (M. Macleay); Sowerby, Conch. Illus., 1832,

fig. 29, p. 12 (1841), No. 112, "New South Wales"; Quoy and Gaimard, 1834, Voy. "Astrolabe," Zool., vol. iii., pl. xlviij., figs. 19-26; Menke, 1843, Moll. Nov. Holl., p. 30, *Cypraea (Trivia)*, "Western shore of Australia"; Kiener, Coq. Viv., 1845, p. 138, Sp. 125, pl. xlviij., 2 bis; Reeve, Conch. Icon., 1846, vol. iii., pl. xxiv., fig. 138; Angas, Proc. Zool. Soc., London, 1867, p. 206; also 1878, p. 867, "Fowler Bay and Cape Northumberland," South Australia; Sowerby, *Cypraea (Trivia)*, 1870, Thes. Conch., vol. iv., p. 45, pl. 325, figs. 439, 440 (*Cypraea*, pl. xxxiv.); Brazier, Proc. Zool. Soc., London, 1872, p. 86; Weinkauff, 1881, Conch. Cab. (Ed. Küster), Band. v., Abt. iii., p. 142, pl. xl ix., figs. 14, 15; Tryon (*Trivia*), 1885, Man. Conch., vol. vii., p. 206, pl. xxiii., figs. 53, 54; Brazier, Proc. Linn. Soc., N.S.W., vol. ix., p. 29; Beddome, 1898 (*Trivia*), Proc. Linn. Soc., N.S.W., vol. xxiii., pl. xxi., fig. 19; Pritchard and Gatliff (1899), 1900, vol. xii. (New Series), p. 187, Victorian coast; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 374; Tasmania; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 111, No. 2, "100 fathoms, off Cape Pillar."

Taken in 80 fathoms 80 miles west of Eucla, 2 alive, without dorsal colour-blotches.

### *Ovula philippinarum*, Sowerby. *not Sodalis*

*Ovula philippinarum*, Sowerby, Proc. Zool. Soc., London, 1848, p. 136; also Thes. Conch., 1855, vol. ii., p. 481, Sp. 44, pl. c., figs. 57, 58, "Philippines"; Reeve, Conch. Icon., 1865, Sp. 46, pl. x., figs. 46a, 46b; Tryon, Man. Conch., 1885, vol. vii., p. 252, pl. iv., figs. 100-9. He gives among its synonyms *O. angasi*, A. Adams (from Port Curtis, Australia), etc.

One example, dredged in 72 fathoms 40 miles west of Eucla, 18.5 mm. in length, not quite so solid as the figures in the above plates seem to show.

### *Tonna variegata*, Lamarck. *not Sodalis*

*Dolium variegatum*, Lamarck, 1822, Anim. S. Vert., vol. viii., p. 261; also 1844 (Edition Deshayes), vol. x., p. 143, No. 6, "The seas of New Holland, in the Bay of Dogs"; Angas, Proc. Zool. Soc., 1867, p. 197, recorded for New South Wales; also by Hedley, Mem. Austr. Mus., 1903, vol. iv., p. 341; Tryon, Man. Conch., 1885, vol. vii., p. 262, pl. iii., fig. 13.

*Tonna variegata*, Lamarck, Hedley, Austr. Assoc. Adv. Science, 1909, p. 361, recorded for Queensland.

A fresh shell, 85 mm. by 65 mm., was taken in 100 fathoms 80 miles west of Eucla. This is the easterly limit on the southern Australian coast for the species to my knowledge. Its absence from South Australian, Victorian, and Tasmanian waters makes it probable it has come from the north round Cape Leewin.

### *Cassis fimbriata*, Quoy and Gaimard. *596*

*Cassis fimbriata*, Quoy and Gaimard, Voy. "Astrolabe," 1833, Zool., vol. ii., p. 596, pl. xliii., figs. 7, 8; Angas, Proc. Zool.

Soc., 1865, recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 188, recorded for Victoria.

One individual, 83 mm. long by 52 mm. broad and 46 mm. high, with three spiral rows of tubercles on the body-whorl, was taken alive in 100 fathoms, quite typical in form and colour, and a second one dead.

*Antecephalium*

*Cassidea adcocki*, Sowerby.

532

*Cassis adcocki*, Sowerby, Proc. Mal. Soc., 1896, vol. ii., p. 14, text figure: Type locality—Yankalilla Bay, South Australia; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1912 (New Series), part 1, p. 170, recorded for Bass Straits.

One example was taken dead in 100 fathoms 90 miles west of Eucla.

*Cassidea pyrum*, Lamarck.

not valid

*Cassis pyrum*, Lamarck, Anim. S. Vert., 1844 (Edition Deshayes), vol. x., p. 33, "New Holland"; Angas, Proc. Roy. Soc., 1867, p. 197, recorded for New South Wales; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 189; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 373 (*Semicassis*), recorded for Tasmania.

*Cassis nivea*, Brazier, Proc. Zool. Soc., 1872, p. 616, pl. xliv., fig. 1.

*Cassis tumida*, Petterd, Proc. Roy. Soc., Tasmania, 1886 (1885), p. 321.

*Cassis thomsoni*, Brazier, Proc. Linn. Soc., N.S.W., 1875, vol. i., p. 8; Hedley (*Cassidea pyrum*, Lamarck, var. *thomsoni*, Brazier), Mem. Austr. Mus., 1903, vol. iv., part 6, p. 341, pl. xxxv., figs. 2, 3.

Dredged in 100 fathoms 90 miles west of Eucla, 4; in 75 to 120 fathoms 120 miles west of Eucla, 1; in 95 fathoms 90 miles west of Eucla, 3. All were well coronated, with moderately exserted spires and with more or less marked axial plicæ on the inflation of the body-whorl, a little below the coronation. The colour when fresh was a pink-flesh tint, with a blackish-purple on the varix of the canal, and about seven blotches of black-purple on the outside of the recurved labrum, fading away towards the dorsum as vanishing spiral flames. Some have two spiral bands of orange blotches on the body-whorl.

One quite fresh shell was taken in 140 fathoms, 34 mm. 22·5 mm., without angle or tubercles or plicæ, with a thickened reflected lip, with seven purplish-black spots on it, a micromorph of the variety found to the east of Bass Straits.

*Antecephalium*

*Cassidea semigranosa*, Lamarck.

529

*Cassis semigranosa*, Lamarck, 1822, Anim. S. Vert., vol. vii., p. 228, No. 23: Type locality—"The seas of New Holland";

Angas, Proc. Zool. Soc., 1865, p. 168 (*Semicassis*), recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 190, recorded for Victoria; Tate and May, 1901, Proc. Linn. Soc., N.S.W., vol. xxvi., p. 373 (*Semicassis*). "South and east coasts of Tasmania."

One dead shell, taken in 80 fathoms 80 miles west of Eucla.

**Ficus tessellatus**, Kobelt. *not Yolus*

*Ficula tessellata*, Kobelt, Conch. Cab. (Ed. Küster), 1881, Band. iii., Abt. 3.B., p. 12, Sp. 6, Taf. ii., fig. 3: Type locality—Australia.

*Pyrula tessellata*, Kobelt, Tryon, Man. Conch., 1885, vol. vii., p. 267, pl. v., fig. 31, Rosemary Island, Australia.

One fragment, taken in 100 fathoms 90 miles west of Eucla. This is a new genus for the southern coast of Australia.

*Charonia*  
**Cymatium rubicundum**, Perry. 535

*Septa rubicunda*, Perry, 1811, pl. xiv., fig. 4; Gatliff, Viet. Naturalist, 1902, vol. xix., No. 5, p. 76; (*Lotorium*) Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1905, vol. xviii. (New Series), part 2, p. 41; (*Septa*) Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908; (*Cymatum*) Hedley, 1909, Austr. Assoc. Adv. Sci., p. 360, "Queensland."

*Triton australe*, Lamarck, Anim. S. Vert. (Edition Deshayes), 1843, vol. ix., p. 625.

*Triton nodiferus*, Lamarck, Anim. S. Vert. (Edition Deshayes), 1843, vol. ix., p. 624.

*Triton sauliae*, Reeve, Conch. Icon., 1844, pl. v., fig. 17, "Philippines."

Examples were taken along the 100-fathom line. Three were only 40 mm. and 30 mm. in length. Each of these retained the protoconch, which was conical, and consisted of four quite smooth, sloping, slightly conical whorls. The extreme tip, however, in each example was absent. Three large ones were obtained alive up to 21 cm. long by 11 cm. broad, including the everted lip. These were somewhat more elongate and narrow than those found on the shore at Albany and Wedge Island and less solid, and were less deeply coloured than those taken on the beach on the west coast of Australia.

*Cymatium verrucosum* <sup>ELLA</sup>, Reeve. 544

*Triton verrucosus*, Reeve, Proc. Zool. Soc., London, 1844, p. 118, hab. (?); Conch. Icon., 1844, vol. ii., pl. xvii., fig. 71; Kobelt, Conch. Cab. (Ed. Küster), 1878, Band. iii., Abt. 2, p. 188, pl. liii., figs. 6, 7; Tryon, Man. Conch., 1881, vol. iii., p. 24, pl. xiii., fig. 117; Pritchard and Gatliff, *Lotorium verrucosum*, Reeve, Proc. Roy. Soc., Victoria, 1898 (1897), vol. x. (New Series), p. 266, recorded for Victoria; Tate and May, *Lampusia*, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 355, for Tasmania.

*Triton quoyi*, Reeve, Proc. Zool. Soc., London, 1844, p. 118; Conch. Icon., 1844, vol. ii., pl. xix., fig. 93.

Taken in 75 fathoms 80 miles, and in 100 fathoms 90 miles, west of Eucla. It has the ordinary characters of the *T. quoyi* form.

**Cymatium vespaceum**, Lamarek. *not Scler*

*Triton vespaceum*, Lamarek, 1822, also Lamarck, Anim. S. Vert. (Edition Deshayes, etc.), 1843, vol. ix., p. 636, *hab.* (?), 14 lines long; Kiener, Spec. Coq. Viv., vol. vii., 1842, p. 18, No. 13, pl. iii., fig. 2, "Indian Ocean"; Menke, Moll. Nov. Holl., 1843, p. 25, "West coast of Australia"; Tryon, Man. Conch., 1881, vol. iii., p. 22, pl. xii., figs. 94-100; Hedley (*Cymatium*), Austr. Assoc. Adv. Sci., 1909, p. 360, "Queensland."

Two examples, taken in 100 fathoms 90 miles west of Eucla, 23.5 mm. long and 20 mm. broad.

**Gyrineum ranelloides**, Reeve. *not Scler*

*Triton ranelloides*, Reeve, Proc. Zool. Soc., 1844, p. 111; Conch. Icon., 1844, No. 10, pl. iii., figs. 10a, 10b, *hab.* "Matnog, Province of Albay, Island of Luzon, Philippines (found on the reefs), Cuming"; Tryon, Man. Conch., 1881, vol. iii., p. 267, gives it as a synonym of *Ranella cruentata*, Sowerby.

*Gyrineum ranelloides*, Reeve, Hedley, Austr. Assoc. Adv. Sci., 1909, p. 361, "Queensland."

One living specimen was dredged in 101 fathoms 80 miles west of Eucla. The operculum is shown in pl. xvi., fig. 7, and the radula in pl. xvi., fig. 6. The shell is 50 mm. long by 24 mm. at its widest part, including the varix, with a shortly conical protoconch of five whorls. The first three are very depressed, scarcely rounded; the last two are convex, and rather rapidly increasing. The first four have two erect, sharp, hair-like spiral threads, at about equal distances from the sutures and each other, and numerous though not closely crowded, oblique similar axial threads. These gradually vanish towards the beginning of the last whorl; this ends abruptly where the ordinary sculpture of the spire-whorls begins. This consists of a row of large tubercles on the median angle, three rows of tiny tubercles above these and one below. On the body-whorl the last become successively larger, and another row succeeds them further forward, and several rows of large granules are intercalated. The tubercles are deeper yellowish-brown than the ground-colour, and there are stray axial flames of darker brown and articulated spirals of broken lines or tiny spots of brown. The reflected lip just beyond the varix is very daintily spotted on its inner margin with dark-brown, which clouds also the upper part of the inner lip between its white plicae. The lower half of the columella is white, bordered above by the yellow of the back of the pre-

ceding snout. The round gutter at the back of the aperture is very marked. The varices do not run continuously from spire to spire as in *Ranella*, but stand one-fourth of the circumference behind that in the spire below.

An identical specimen was sent to me some years ago as from Japan by Mr. Sowerby under the name *Triton ranelloides*, Reeve.

**Argobuccinum australasia**, Perry. *not Sodus*

*Biplex australasia*, Perry, 1811, Conchology, pl. iv., figs. 2, 4, "New Holland and Van Diemen's Land."

*Ranella leucostoma*, Lamarck, 1822, Anim. S. Vert., vol. vii., p. 150.

Dredged in 101 fathoms 80 miles west of Eucla, 1 immature, 50 mm. by 27 mm., with a conical protoconch of four sloping convex whorls, the minute extreme apex appears to be absent; colour of shell, light bluish-grey, covered with a thin epidermis, like coarse muslin, with a minute erect hair at each intersection. Aperture quite white. Also, a mature shell 90 mm. by 43 mm., solid, and lighter in colour than those from Tasmania.

**Nassaria torri**, Verco. Pl. xiii., figs 3, 4. *Sodus* *not*

*Cominella torri*, Verco, Trans. Roy. Soc., S.A., 1909, vol. xxxiii., p. 271, pl. xxi., figs. 10, 11.

The species was founded on several examples collected on St. Francis Island thrown up among the rocks, but none of them were full grown, and all of them were more or less rolled and damaged. But on May 27, 1912, the Federal trawler "Endeavour" obtained a perfect specimen from a depth varying from 77 to 105 fathoms, about 40 miles west of the meridian of Eucla. It was inhabited by a hermit crab. It has nine whorls. The protoconch, comprising one and a quarter turns, is blunt, slightly excentric and smooth. The suture ascends for about a sixth of the circumference on the last whorl, and forms with a curved callosity on the inner lip, a narrow gutter at the back of the aperture.

The aperture is obliquely axially ovate, narrowed posteriorly to a gutter and anteriorly to a short, wide, oblique canal. The outer lip is thin, simple, uniformly convex, slightly reflected, smooth within. The inner lip is an expanded glaze on the body-whorl, thickened internally into a curved callus, extending slightly above the back of the aperture at the suture; anteriorly the labium is thick, detached from the base of the whorl, and carried forward over the very valid varix of the canal to form a false, well-marked umbilicus, and to join almost at a right angle with the left margin of the

canal, which is dorsally curved to run almost vertically for about half an inch. The varix of the notch projects as a very faint oblique prominence on the columella. The columella is sigmoidally concave above and convex below.

The bent canal removes it from the genus *Cominella* and separates it from *Phos* and places it in *Nassaria*. If this location prove correct it is a gigantic member of the genus, measuring 69 mm. in length by 29 mm. in breadth. A second example, not full grown and not in very good condition, was taken in 100 fathoms 90 miles west of Eucla.

*Siphonalia dilatata*, Quoy and Gaimard

*Fusus dilatatus*, Quoy and Gaimard, 1833, Voy. "Astrolabe," Zool., vol. ii., p. 498, pl. xxxiv., figs. 15, 16; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1898 (1897), vol. x. (New Series), part 2, p. 272.

*Fusus tasmaniensis*, Adams and Angas, 1863, Proc. Zool. Soc., London, p. 421, pl. xxxvii., fig. 1.

*Siphonalia maxima*, Tryon, 1881, Man. Conch., vol. iii., p. 135, pl. liv., fig. 335.

*Siphonalia oligostira*, Tate, Trans. Roy. Soc., S.A., 1891, vol. xiv., p. 258, pl. xi., fig. 6.

Taken in 105 fathoms 30 miles west of Eucla, with marked angulation, valid sharp transverse coronating tubercles, with numerous crowded fine deep-brown spiral cords, the colour deepest in a rather broad band revolving over the middle of the body-whorl, the interior a beautiful vivid salmon-tint or white, two examples.

Taken in 100 fathoms 90 miles west of Eucla, 2 much longer and narrower examples, one with a more rounded shoulder, with rounder and more pliciform tubercles, fewer broader spiral cords, pure white both outside and in; the second from this station comes midway between this and the first two in its colouring and sculpture. One immature, 48 mm. long, taken in 72 fathoms 40 miles west of Eucla.

*Fusus novae hollandiae*, Reeve.

*Fusus novae hollandiae*, Reeve, Conch. Icon., 1847, vol. iv., p. 197, pl. xviii., fig. 70; Angas, Proc. Zool. Soc., 1877, p. 179, recorded for New South Wales; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., recorded for Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1898, vol. x. (New Series), part 2, p. 269, recorded for Victoria; in vol. xviii., 1906, p. 43, they state that the type is in the National Museum, Victoria.

One example was dredged in 100 fathoms 90 miles west of Eucla, with the mouth somewhat broken, 67 mm. long by 22 mm. wide, spire 24 mm. long. Its shoulder is median and sharply angled, with nine pliciform axial ribs, more

marked below the angle than above, much narrower than their interspaces; the four spiral threads above the shoulder very fine, those below it very fine but slightly larger: those on the body-whorl finer than in Tasmanian specimens. A bright reddish-brown spot between the costæ at the angle.

**Fasciolaria australasia**, Perry. 643

*Pyrula australasia*, Perry, 1811, Conchology, pl. liv., fig. 4, "New Holland and Van Diemen's Land."

*Fasciolaria coronata*, Lamarck, 1822, Anim. S. Vert, vol. vii., p. 120.

One individual, dredged in 72 fathoms 60 miles west of Eucla, is rather a marked variant. It is 143 mm. long by 55 mm. at its widest part. The protoconch of two rounded smooth whorls is less eccentric and pulloid than usual. The spire is unusually long, 62 mm., of six whorls, very sharply shouldered just above the middle and markedly contracted at the sutures, with about eleven pliciform tubercles with sharp transverse summits, corded with a spiral thread. A very thin horny epidermis. Colour, first three spire-whorls brownish, all the rest quite white; interior pure white. Another individual, taken in 100 fathoms 80 miles west of Eucla, was, as to protoconch, shape, and colouration, one of the common coronated forms.

*Amoena*

**Scaphella undulata**, Lamarck. 644

*Voluta undulata*, Lamarck, Ann. du Mus. Hist. Nat., vol. v. 1804, p. 157, pl. xii., figs. 1a, 1b.

Four examples, taken 80 miles and 90 miles west of Eucla from 72 to 105 fathoms, all immature and dead and quite typical.

*Erica*

**Scaphella fulgetrum**, Sowerby. Pl. xi. and xii. 642

*Voluta fulgetrum*, Sowerby, Tankerville Catalogue, 1825, p. 81, No. 2149; Appendix, p. xxviii., pl. iv., v.: Type locality unknown; Broderip, Zool. Jour., 1826, vol. iii., p. 35; Wood, Index. Test. Supp., 1828, p. 59, pl. iii., fig. 3; Anim. S. Vert., 1844 (2nd Edition, Deshayes, etc.), vol. x., p. 414; Sowerby, Thes. Conch., 1847, vol. i., p. 207, Sp. 35, pl. xlvi., figs. 33, 34; Reeve, Conch. Icon., 1849, pl. vi., figs. 13a, 13b; Chenu, Man. de Conch., 1859, vol. i., p. 191, fig. 973; W. F. Petterd, Journ. Conch., 1879, p. 344; Tryon, Man. Conch., 1882, vol. iv., p. 96, pl. xxviii., figs. 104, 105.

This species was described by G. B. Sowerby, sen., in the Sale Catalogue of the Earl of Tankerville's collection—the only specimen he had ever seen. It was a fine individual, and two excellent full-sized coloured figures are given of it. Its habitat was unknown. Broderip reproduced the description of it about a year later in the Zool. Jour., attributing

it to Sowerby. In 1849 Reeve says, "It was first described by Mr. Broderip from a specimen of rather large size in the celebrated Tankerville Collection, now in the British Museum," and places Broderip's name before Sowerby's in his references. This strange mistake evidently misled Petterd, who cites Broderip as the author of the species; but later writers correctly give Sowerby his due. Reeve is the first to give the *habitat* of the species, namely, South Australia. In my copy of the Tankerville Catalogue the price against the type specimen is £31 10s.

*Variations.*—It is very variable; one from Adcock's collection, not quite mature, is 7 in. long by 17·7 cm. by 8·3 cm. The type is described as 6 in. by 3 in. Mr. Mathews tells me in a letter that the largest he has seen was 8 in. by 3½ in., taken on Troubridge Island. But a mature shell, with ascending suture and fully-formed lip, may be only 3 in. by 1·55 in.

Another example is 4·3 in. by 1·7 in., so that if it were 6 in. long it would be only 2·4 wide—more than  $\frac{1}{2}$  in. less in diameter than the type. The shoulder, too, may be more marked than in the type, which is rather high-shouldered, and may be somewhat more concave below the suture. When senile the inner lip may have a thick axial pad of callus extending a full inch beyond the aperture. The glaze of the inner lip not only extends very far laterally over the body-whorl, but towards the spire for half an inch or more above the suture, and in shells with rusty-brown staining this covers the stain over and leaves a broad, wavy, whitish band above the suture throughout the last spire-whorl.

Tryon says, "*V. fulgetrum*, in fact, is intermediate between *V. fusiformis* and *V. papillosa*, and very probably the three are merely diverse forms of one species." I think the three species are distinct, the protoconch of *S. fulgetrum* is a sufficient diagnostic from either of the other species.

Sowerby, in the Thes. Conch., refers to one variety (*S. dictua*, n. var., Verco, Trans. Roy. Soc., S.A., 1909, vol. xxxiii., p. 274, pl. xxi., fig. 7) which has only a delicate reticulate lace-like colouration, and a second which has two rows of chestnut spots on the last volution. But the colour variations are quite numerous.

1. There is the typical shell with the axial zizag brown dashes from which the shell derives its name. It will be noticed these tend to have two spiral rows of blotches, one just below the shoulder and the other over the lower part of the body-whorl. The blotches are roughly crescentic or arrow-headed, with their concavity towards the outer lip. At the suture the markings are flame-like.

2. There may be two spirals of large crescentic or arrow-headed spots, with flames at the suture; var. *lunulisligata*.
3. These may be reduced to two spirals of small spots the size of peppercorns; var. *punctisligata*.
4. There may be no spots except a few small ones on the first and second spire-whorls, the surface being more or less deeply and densely reticulated with brown; var. *dictua*, Verco.
5. The axial lightning zigzags may be crossed by two continuous deep purple-brown bands, one below the shoulder, the other over the lower part of the volution; var. *connectens*.
6. The only colour ornament may be these two bands and some small flames at the suture, all the axial markings being absent; var. *bicincta*.
7. The subsutural flames may unite to form a third spiral band; var. *tricincta*.
8. Only the lower spiral band may be present, but this quite valid; var. *unicincta*.
9. There may be no colour-markings, the shell being pure white; var. *alba*.

I have had several of these colour varieties reproduced in pl. xi. and xii.

The *habitat* of the species is very restricted. It has been taken in both Gulf St. Vincent and Spencer Gulf, and at some points is a fairly common shell. Mr. Mathews says the blacks tell him the animal lives on sandbanks nine or ten chains from the shore, which are covered by about 18 in. of water at low spring tide. He has taken them crawling ashore. It has been collected as far to the east as Kingston, in Lapepede Bay. I found none on the beaches from Sceales Bay to Point Sinclair, nor on St. Francis Island nor at Esperance, Hopetoun, King George Sound, nor on the west coast of Australia. It has not been recorded from Victoria.

Its bathymetrical distribution is interesting. Taken alive, of large size and beautifully painted, in all its varieties in the shallow water of the gulfs, and with only the lace-like reticulations, from the lobster-pots at Port Victor, and in 75 to 120 fathoms of water from 40 to 120 miles west of Eucla, 9 examples. The shells from these greater depths were all dead, mostly the home of hermit crabs, and all had the faint reticulated ornament except two, which showed the single deep band; none had the axial lightning markings.

*ScapheLLA verconis*, Tate. ~~not SocieS~~

*Voluta verconis*, Tate, Trans. Roy. Soc., S.A., 1892, vol. xv., p. 125, pl. i., fig. 5: Type locality—Gulf St. Vincent (Verco).

Taken in 75 fathoms 80 miles west of Eucla, 1 dead, immature; in 80 fathoms same locality, 1 dead, mature; in 100 fathoms 90 miles west of Eucla, 3 dead, immature.

*Voluta peplum*  
*Scaphella translucida* Verco

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*Voluta translucida*, Verco, Trans. Roy. Soc., S.A., 1896, vol. xx., p. 217, pl. vi., figs. 4, 4a.

In 100 fathoms 90 miles west of Eucla a large lump of coral was taken, and in a cavity of this when chopped open lay a perfect specimen dead, with a deciduous thin white smooth epidermis, 35 mm. long by 14 mm. broad, somewhat smaller than the type.

*Gottonea*

*Scaphella dannevigi*, n. sp. Pl. xiii. figs. 1, 2.

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A large, thin, brown, polished, elliptical shell. Protoconch absent, the line of separation thin and jagged; the exposed pillar very oblique, thick, smooth, and rounded, concealing the projecting hemispherical apex of the shell. Whorls three, shouldered below the suture, at the upper fourth of the intersutural space. Shoulder coronated with tubercles, eleven on a whorl, none on the first whorl, the earlier tubercles pointed, the later becoming broad until about half as wide as the interspaces, shortly pliciform, but expanding, and vanishing before reaching the lower suture. Whorls sloping, concavely sub-gradate above the shoulder, sloping slightly convex below. Suture distinct, minutely channelled. Body-whorl large, oval, narrowed anteriorly. Aperture axially narrowly elliptical. Inner lip a thin extensive glaze over the whorl; outer lip immature, thin, uniformly convex, and (as the growth-lines show) curving roundly to a wide, rather shallow, anterior notch. Columella subconcave, three very oblique plaits, the lowest forming the margin of the canal.

*Sculpture*.—There are crowded, fine, wavy, spiral liræ, about twenty above the shoulder, less valid over this and soon becoming obsolete below it. Accremental striæ granulate these and become ruder towards the aperture. Colour, dark chestnut-brown, obscurely minutely spirally crowdedly flecked with white, with scattered darker-brown blotches, the tips of the tubercles a deep blackish-brown. A narrow creamy band, distinct on its under margin, indistinct along its upper border, starts just within the back of the aperture and winds round the body-whorl to the middle of the outer lip.

*Dimensions*.—Length, 16·3 cm., of the aperture 11·3 cm.; width, 8·33 cm., of the aperture 4·77 cm.; diameter of the protoconchal base, 18 mm.

*Locality.*—Type specimen taken in the trawl at 105 to 77 fathoms 90 miles west of the meridian of Eucla.

In 1896 off Newland Head, outside Backstairs Passage, I dredged a dilapidated broken specimen lacking the whole of its last whorl, but measuring 23·5 cm. in length, so that in life it must have been a very large shell. No others were taken by me till I secured the type and eight other examples from the material brought up by the trawl of the "Endeavour" in water ranging from 75 to 105 fathoms, and extending from 40 to 120 miles west of Eucla.

The protoconch was absent from every example. Apparently it is normally deciduous, and must be shed early, as it is absent from a well-preserved specimen 11 cm. long. It must be large, and probably resembles that of *S. mamilla*, which, however, is almost always intact. The whitish band may be centrally well marked and fade away at both margins.

The species is named after Mr. Dannevig, the Commonwealth Director of Fisheries, to whom I was indebted for much help in securing the material obtained during my short voyage on the "Endeavour."

Type in my collection.

*Livonia* 705  
*Scaphella roadnightæ*, McCoy. Pl. xvi., figs. 1, 2.

*Voluta roadnightæ*, McCoy, Ann. Mag. Nat. Hist., 1881, vol. viii., 5th Series, p. 89, pl. vii., figs. 1, 2: *Type locality*—Ninety-mile Beach, Gippsland, Victoria; Tryon, Man. Conch., 1882, vol. iv., p. 96, pl. xxx., fig. 128; Sowerby, Thes. Conch., 1887, p. 298, Sp. 78, pl. 573 (*Voluta*, pl. xiv.), fig. 143; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1897, vol. x. (New Series), part 2, p. 282, ("Portland (Nat. Mus.)"); A. Kenyon, Proc. Mal. Soc., London, 1899, p. 267; Baldwin-Spencer, Proc. Mal. Soc., London, 1901, vol. iv., p. 184; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., part 3, p. 360, Maria Island (May), east coast, near Swansea (Mrs. Irvine), Tasmania; Pritchard and Gatliff, op. cit., 1906 (1905), vol. xviii., part 2, p. 45.

This species was found by Baron von Mueller when on a visit to the Gippsland Lake District at his hotel, where it was in use to prop open his bedroom window. It had been found on the Ninety-mile Beach by Mrs. Roadnight, his landlord's mother, after whom it is named. It was given by Mueller to Sir Frederick McCoy, who described it in 1881. In 1899 some seven specimens were known, two of them from the eastern coast of Tasmania. Later, several were obtained from lobster-pots on the Victorian coast, and Mr. Bastow kindly sent me one. Mr. Dannevig, the Director of Fisheries, tells me he has taken several specimens when trawling off the coasts of Victoria and Tasmania, east of Bass Strait, all dead; and occasionally off the South Australian coast, but the first living examples were brought up from about 100 fathoms

some 40 miles west of Eucla. They were of medium size, mature, and almost destitute of the zigzag colour-markings. When the trawler was in the Great Australian Bight in 1912 several examples were taken along the 100-fathom line in various stages of preservation. All were inhabited by hermit crabs but one; from this a radula was obtained. From the material thus provided the following information is supplied:—The shell when mature may measure only 4 in. long by 2½ in. broad, or it may reach 9 in. by 4¾ in. One example is 7 in. by 4½ in., proportionately much more ventricose, with a shorter spire, though with the same number of whorls. The protoconch is very conspicuous and is never absent, which is remarkable, since fully three-fourths of a large hemisphere projects. It is set obliquely, so that the nuclear spheroid has its flattened pole on one side. The initial point is deep blackish-brown, and this colour runs along the nuclear suture, and gradually spreads and fades out. There is no defined inner lip, except in one example, a micromorph, which has a detectible glaze spreading over the base of the body-whorl. In mature shells the outer lip ascends well and rapidly at the suture for a full inch in larger examples, and is here markedly everted, and the whole of the outer lip is somewhat curved out. There is a well-marked anterior notch ¾ in. deep by 1 in. wide, and the low wide rounded varix of the notch winding round to the upper plait on the columella forms a low furrow, which in senile shells become filled up and even convex. The plaits are normally three, and remain unchanged in senile shells; but often another plait arises between the lowest two, sometimes between the highest two, and once above all the rest. When senile the shell becomes very heavy, thickened especially on the inner side of the everted lip and along the columella. Colour: the typical tint is pale-yellowish, but it may be a rich chestnut-brown. The ornament consists typically of axial series of oblique lines in zigzag arrangement; these oblique lines may be very long, going one-third round the shell, concealing any axial disposition, or they may be short and close set and blotchy at their junction, so as to exaggerate it. Sometimes they are altogether absent, leaving only the ground-tint, almost an albino variety, as in the two examples taken alive by Mr. Dannevig in 100 fathoms west of Eucla. In some specimens a white spiral band, starting from the aperture just below the suture, winds round the shell and interrupts all the colour-markings. The radula (pl. xvi., figs. 1, 2) from a living individual of 21 cm. in length measures 21 mm. by 1 mm., and consists of a single line of seventy imbricating, tricuspidate, rachidian teeth only. The old teeth have their cusps completely worn away, and are reduced to the crescent-shaped bases.

*Ericusa*

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*Scaphella papillosa*, Swainson. Pl. xiv., figs. 1-3.*Voluta papillosa*, Swainson. Appendix, Bligh Catalogue.

*Voluta papillaris (papillosa)*, Swainson, Sowerby, Genera of Shells, 1820-1825, pl. ccli., no locality. According to a note by W. J. B., "the slight alteration here given in the trivial name is only to be considered in the light of a correction of the press." Mr. Sowerby, sen., or Mr. Broderip is, therefore, responsible for the change in the specific name. Kiener, in Coq. Viv., 1839, under the name of *Voluta sowerbyi nobis*, pl. l., 2 figs., gives figures of *V. fusiformis*, Swainson, and refers to them in mistake as *V. papillaris*, Sowerby, and changes the name to *V. sowerbyi*.

Swainson, in Lardner's Cabinet Cyclopaedia, Natural History, Malacology, 1840, p. 108, calls his shell *Scaphella papillaris*, and figures it in the text 12A, and on page 318 refers to it as *Scaphella papillosa*, Sowerby, Gen., as though uncertain which name to retain. Sowerby, in Thes. Conch., vol. i., 1847, p. 207, Sp. 36, pl. xlvii., fig. 30, cites its *habitat* as "Fijee Islands." Reeve, Conch. Icon., 1849, vol. vi., pl. iv., fig. 10, gives Port Lincoln as a *habitat*, under the name *Voluta papillaris*. He writes, "Mr. Swainson named this species *papillosa*, with the view of drawing attention to the remarkable papillary structure of the apex, but as the word signifies 'full of papillæ' it is better rendered *papillaris*. Taking it to refer to the painting, and confounding the species with *V. fusiformis*, M. Kiener has changed the name to do honour to Mr. Sowerby (calling it *V. sowerbyi*, Kiener), because the spots have so rarely the appearance of papillæ." Mr. Sowerby acknowledges the compliment in language severe but not the less true, by calling it "an absurdity." Gray, in Proc. Zool. Soc., London, p. 63, calls it *Volutella papillosa*, Gray. Crosse, Jour. de Conch., 1871, vol. xix., p. 297, refers to it as *Voluta (Alcithoe) papillosa*. Petterd, in Jour. of Conch., 1879, p. 343, as *Voluta papillosa*, Swainson, cites it as from the north coast of Tasmania and Encounter Bay, South Australia, and off the coast of New South Wales, between Montague Island and Twofold Bay, dredged in 1,900 fathoms (Brazier). He creates and describes a variety *macquariensis*, of a uniform yellowish colour without bands or reticulate markings, from Macquarie Harbour, west coast of Tasmania. Tryon, Man. Conch., 1882, vol. iv., p. 96, pl. xxviii., fig. 106, as *Voluta (Alcithoe)*. Brazier, in Proc. Linn. Soc., N.S.W., 1897, vol. xxii., p. 779, describes *Voluta kenyoniana*, from Cape Everard, Victoria, a form with 19-20 axial obtuse ribs, which in Proc. Mal. Soc., London, 1906-7, vol. vii., p. 6, was recognized as only a variety of *Voluta papillosa*, Swainson. Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1898 (1897), vol. x. (New Series), p. 282, give "Phillip Island, Western Port, Portland." Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 360.

Between 40 and 120 miles west of Eucla, about the 100-fathom line, 4 examples were taken. Two, which were mature, measured only 80 mm. in length by 32 mm. in breadth and 71 mm. by 30 mm. One nearly mature, 65 mm. by 29 mm., and one immature, 53 mm. by 22 mm. A specimen from Port Victor measures 105·2 mm. by 50 mm., and one from Victoria 124 mm. by 59 mm.; so that the deep-sea examples are much smaller and proportionately narrower. But their colour is typical, though faint (all were dead shells). They all show the typical proximity and heaping up of three plaits, with a very small plait behind these, and a distinct anterior plait close to and almost forming the border of the canal, though this last was absent from the juvenile example. One of the mature individuals showed obsolete axial costæ on the base of the body-whorl, just beyond the inner lip, so approximating to var. *kenyoniana*, Brazier. Further east the trawler "Endeavour" had taken several examples of this variety, probably to the east of Bass Straits, all dead. A mature micro-morph was 65 mm. long by 32·5 mm. broad, the largest was 112 mm. long by 49 mm. broad. The costæ are more numerous than in the type of the variety described by Brazier (19 to 20), 54 being counted in the penultimate whorl. But their validity and their number vary in the examples examined. In the micromorph they are less crowded, and in another specimen they are almost absent from the body-whorl. The protoconch and ornament resemble those of the specific type. I have had one of these figured on pl. xiv., figs. 2, 3.

Since writing the above Mrs. Agnes Kenyon has kindly lent me the type specimen of Brazier's species for comparison. This can scarcely be said to have 19-20 obtuse ribs, as he describes it. On the body-whorl 44 axial costæ can be counted, and none in the last inch from the aperture. These are rather sharp at their summits, but broad at their bases, and vary very greatly in their size and proximity. In the penultimate there are about 50, but they are so irregular in size and nearness that it is difficult to count them, and they scarcely can be called ribs, but are rather irregular axial costulæ. The figs. 2 and 3 on pl. xiv. are an almost exact reproduction of the type, though taken from an "Endeavour" specimen in my collection.

*Cebolo niltonis*  
*Cymbium-flammeum*, Bolten.

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*Cymbium flammeum*, Bolten, Mus. Boltenianum, 1798, p. 151,  
No. 1899, No. 3.

*Voluta diadema*, Lamarck, Ann. du Mus., vol. xvii., p. 57,  
No. 1.

*Var. Cymbium miltonis*, Gray.

*Voluta miltonis*, Gray, 1833, Griffith's Cuvier's Animal Kingdom, vol. xii., Mollusca, 1834, pl. xxix. (1833); Kiener, Coq. Viv., 1839, p. 10, Sp. 6, pl. x.

*Cymbium miltonis*, Gray, Conch. Cab. (Ed. Küster), 1841, Band. v., Abt. 2, p. 213, Taf. xlii., fig. 1.

*Voluta miltoni*, Gray, Deshayes, Anim. S. Vert., 1844 (2nd Edition), vol. x., p. 406, Sp. 46.

*Melo miltonis*, Gray, Broderip, Thes. Conch., 1847, vol. i., p. 415, Sp. 7, pl. lxxxiii., figs. 24, 25.

*Cymbium miltonis*, Gray, Reeve, Conch. Icon., 1861, pl. xvi.

*Melo miltonis*, Gray, Angas, Proc. Zool. Soc., London, 1878, p. 865.

*Melo dialema*, Lamarck, var. *miltonis*, Gray, Tryon, Man. Conch., 1882, vol. iv., p. 82, pl. xxiii., fig. 28.

It is well figured in Griffiths' Edition of Cuvier's Animal Kingdom, but no description is given, and its name does not appear in the letterpress. Reeve says it was named in honour of Lord Milton, afterwards Earl Fitzwilliam. Its *habitat* was unknown, and is first recorded in Thes. Conch. as from Swan River, Australia. Later Mr. Angas cited it from Fowler Bay, on the South Australian coast, and Mr. Bednall gave me a specimen labelled Streaky Bay, a little distance further east. Three specimens were taken by the Federal trawler "Endeavour," all dead, one in 95 fathoms 90 miles west of Eucla, measuring 11 cm. by 6·2 cm., with four distinct columellar plaits; a second in 88 to 100 fathoms in the same locality, of 17·3 cm. by 9·7 cm., also with four distinct plaits; and a third 19·2 cm. long, with only three plaits, corresponding with the anterior three of the other specimens. It has a much more prominent protoconch and a more elate spire than the second, but otherwise they are quite similar.

Two individuals, from Fowler Bay, obtained from Mr. W. Reed, were taken alive. They have the typical narrow elliptic form, somewhat elate spire, the incurved spines, and four columellar plaits, with abundant white triangles in the ornament. Their walls are of medium thickness. One has in the body-whorl six well-marked axial costations, corresponding with similar axial gutters within, and running down from the spines, showing that the animal curved its shell outwards as it proceeded to form the scale of the spine, and curved it in as it completed the spine.

### *Ancilla oblonga*, Sowerby: *no 1. Gobus*

*Ancillaria oblonga*, Sowerby, Spec. Conch., 1830, part 1, p. 7, figs. 38, 39; Kiener, Coq. Viv., 1843-44, p. 15, No. 10, pl. iv., fig. 2, "The shores of New Holland"; Reeve, Conch. Icon., 1864, vol. xv., pl. viii., figs. 24a, 24b; Sowerby, Thes. Conch., 1866, vol. iii., p. 65 (*Ancillaria*, p. 9), No. 38, pl. cxxiii. (*Ancillaria*, pl. iii.), figs. 57, 58; Tryon, Man. Conch., 1883, vol. v., p. 96, pl. xxxix.,

fig. 47, as a synonym of *A. marginata*, Lamarck; Watson (*Ancilla*), 1886, "Chall.", Zool., vol. xv., p. 231, "38 fathoms, off Bass Strait"; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 365, "Tasmania" = "*A. fusiformis*, Petterd"; Hedley (*Ancillaria*), Memoirs Austr. Mus., 1903, vol. iv., part 6, p. 364, "New South Wales"; Hedley (*Ancilla*), 1909, Austr. Assoc. Adv. Sci., p. 363, "Queensland."

Taken in 100 fathoms 90 miles west of Eucla. Mr. Gabriel has sent me two examples dredged in Western Port. Victoria.

***Ancilla mucronata*, Sowerby.**

*Ancillaria mucronata*, Sowerby, Thes. Conch., vol. iii., 1866, p. 63, No. 30, pl. 211, figs. 11, 12, "Australia"; Reeve, Conch. Icon., 1864, Sp. 10, pl. iv., figs. 10a, 10b, "Tasmania"; Kiener, Coq. Viv., 1843-44, *Ancillaria*, p. 7, Sp. 4, pl. iii., fig. 3, "The shores of New Holland." This figure is most like our shell in colouring.

Taken in 75 fathoms 80 miles west of Eucla, 1; in 80 fathoms 80 miles west of Eucla, 3; in 100 fathoms 90 miles west of Eucla, 1; in 105 fathoms, 3; in 140 fathoms, 2.

They were all dead, but several in very good condition, of a cinnamon or salmon colour, palest in the upper part of the spire and deepest between the lowest white band and the white columella, not quite so deep in the wide space between the two narrow white bands on the body-whorl. Kiener's figure is a fair representation of it. It is quite unlike *A. beachportensis*, Verco.

***Hemipleurotoma quoyi*, Desmoulin.**

*Pleurotoma quoyi*, Desmoulin, Actes. Soc. Linn., Bordeaux, 1842, p. 61.

*Hemipleurotoma*, Verco, Trans. Roy. Soc., S.A., 1909, vol. xxxiii., p. 294.

Taken in 100 fathoms 90 miles west of Eucla, 2.

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**EXPLANATION OF PLATES.**

**PLATE X.**

- Fig. 1. *Cypraea armeniaca*, Verco, dorsal view. *Pl. 516*  
 " 2. " " ventral view.  
 " 3. " " side view.

**PLATE XI.**

- Fig. 1. *Scaphella fulgetrum*, Sowerby.  
 " 2. " " var. *lunulisligata*.  
 " 3. " " var. *connectens*.

**PLATE XII.**

- Fig. 1. *Scaphella fulgetrum*, Sowerby, var. *tricincta*.  
 " 2. " " var. *unicincta*.  
 " 3. " " var. *punctisligata*.

## PLATE XIII.

- Fig. 1. *Scaphella dannevigi*, Verco,  
 " 2. " " apex.  
 " 3. *Nassaria torri*, " Verco, side view.  
 " 4. " " ventral view.

## PLATE XIV.

- Fig. 1. *Scaphella papillosa*, Swainson, micromorph.  
 " 2. " " var. *kenyoniana*, Brazier,  
     ventral view.  
 " 3. " " var. *kenyoniana*, Brazier,  
     side view.

## PLATE XV.

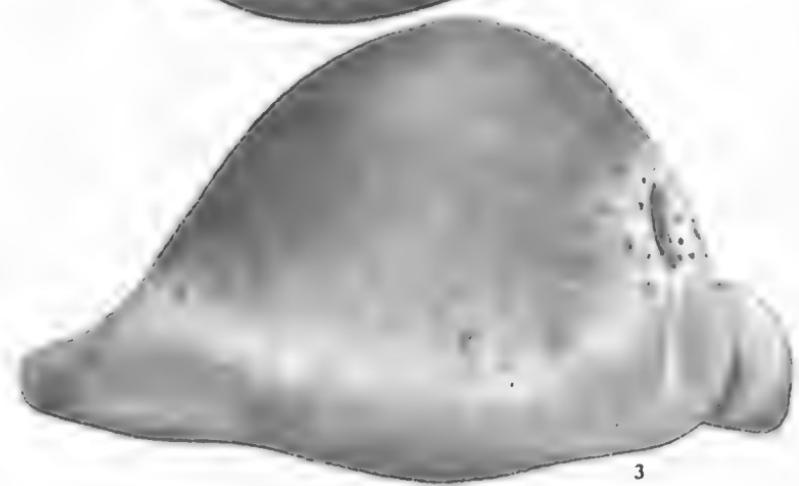
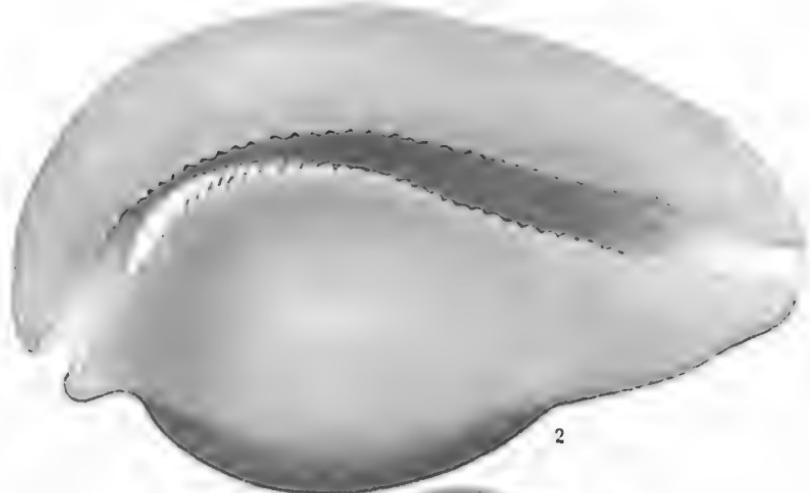
- Fig. 1. *Acmaea calamus*, Crosse and Fischer, var. *polyactina*, Verco.  
 " 2. " " variety.  
 " 3. *Patella axiaerata*, Verco, dorsal view.  
 " 4. " " side view.  
 " 5. *Acmaea patellavecta*, Verco, dorsal view.  
 " 6. " " " interior.  
 " 7. " " " side view.

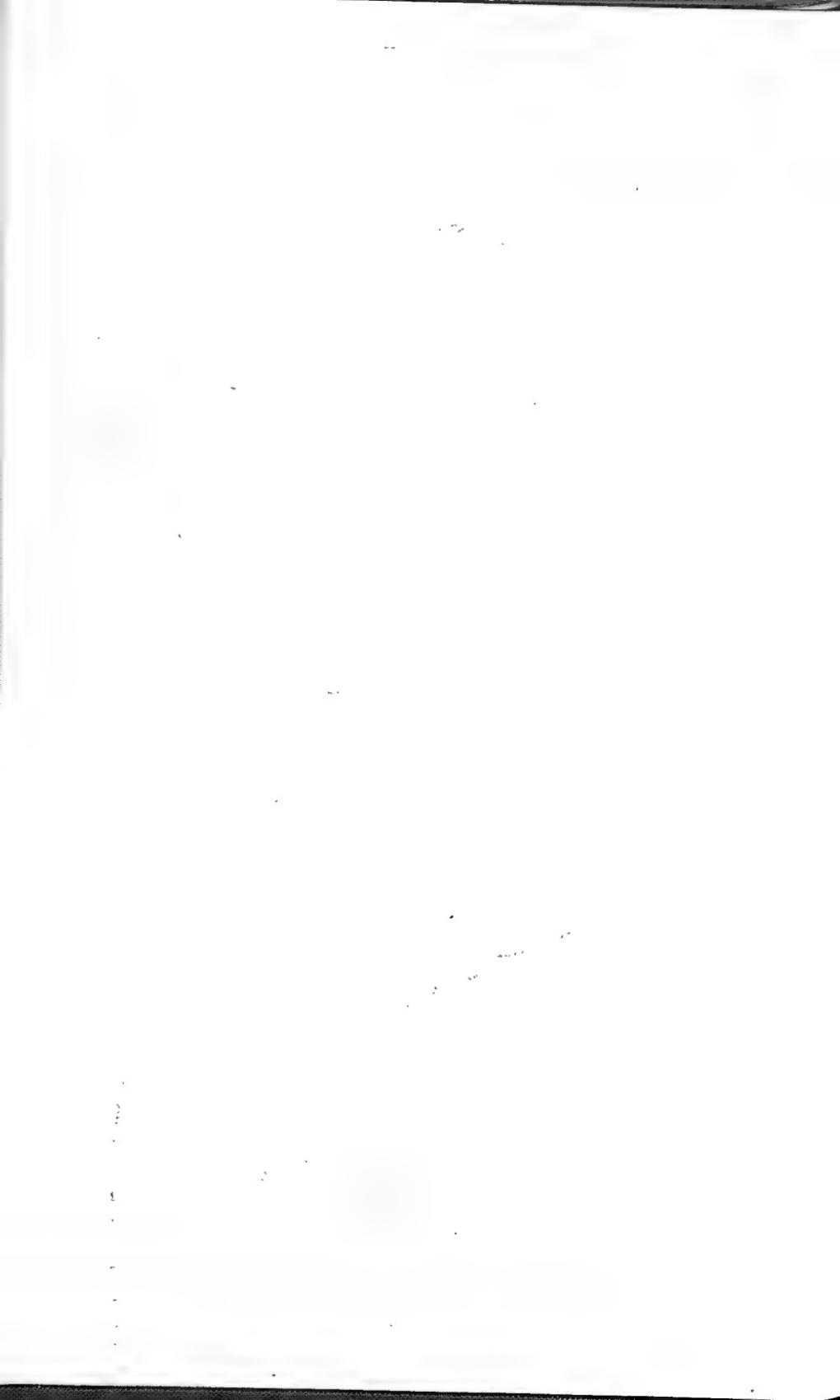
## PLATE XVI.

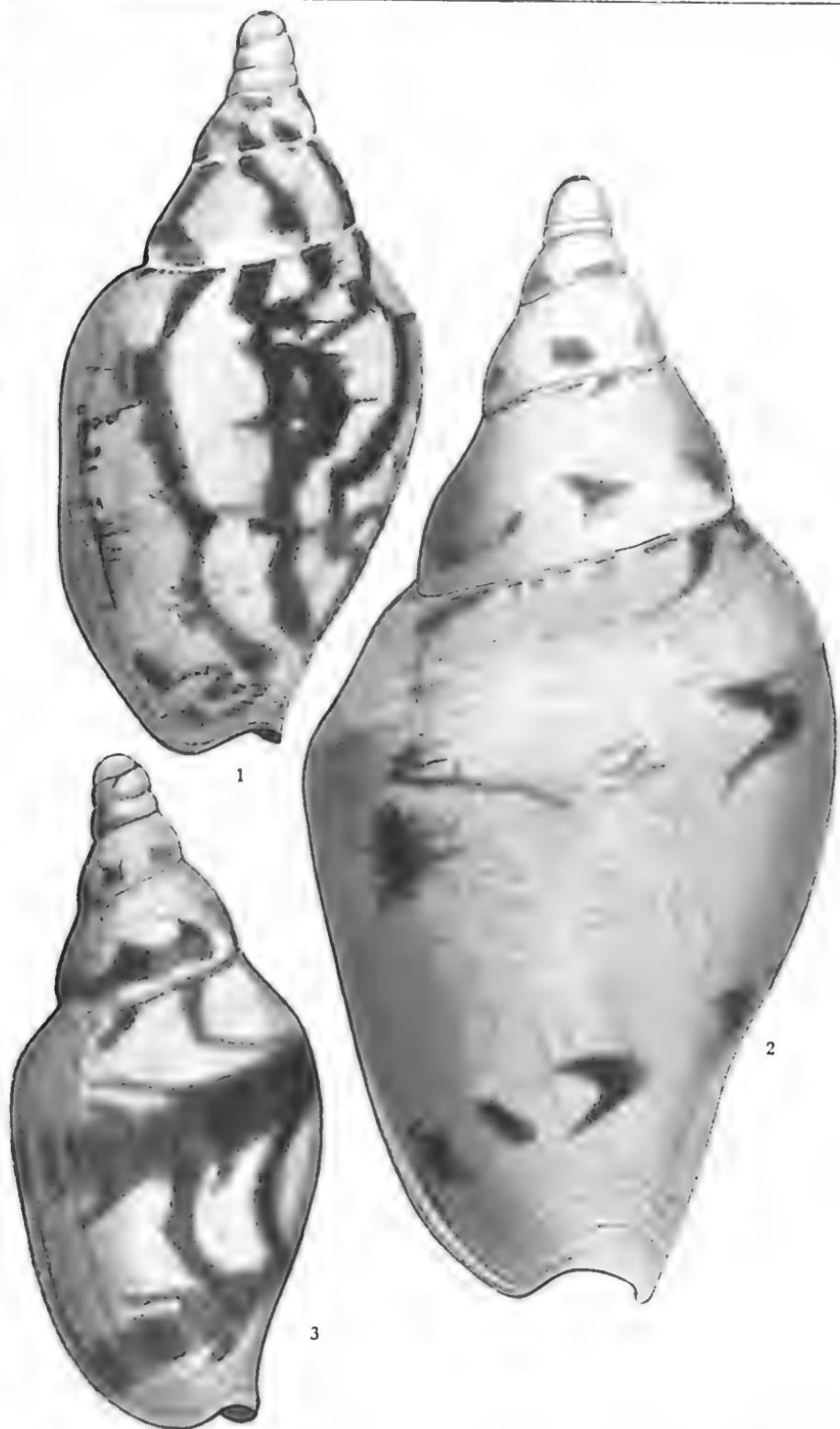
- Fig. 1. *Scaphella roadnightae*, McCoy, radula.  
 " 2. " " worn down.  
 " 3. *Acmaea alticostata*, Angas, " radula.  
 " 4. " " lateral tooth.  
 " 5. " *patellavecta*, Verco, radula.  
 " 6. *Gyrineum ranelloides*, Reeve, radula.  
 " 7. " " operculum.

## PLATE X

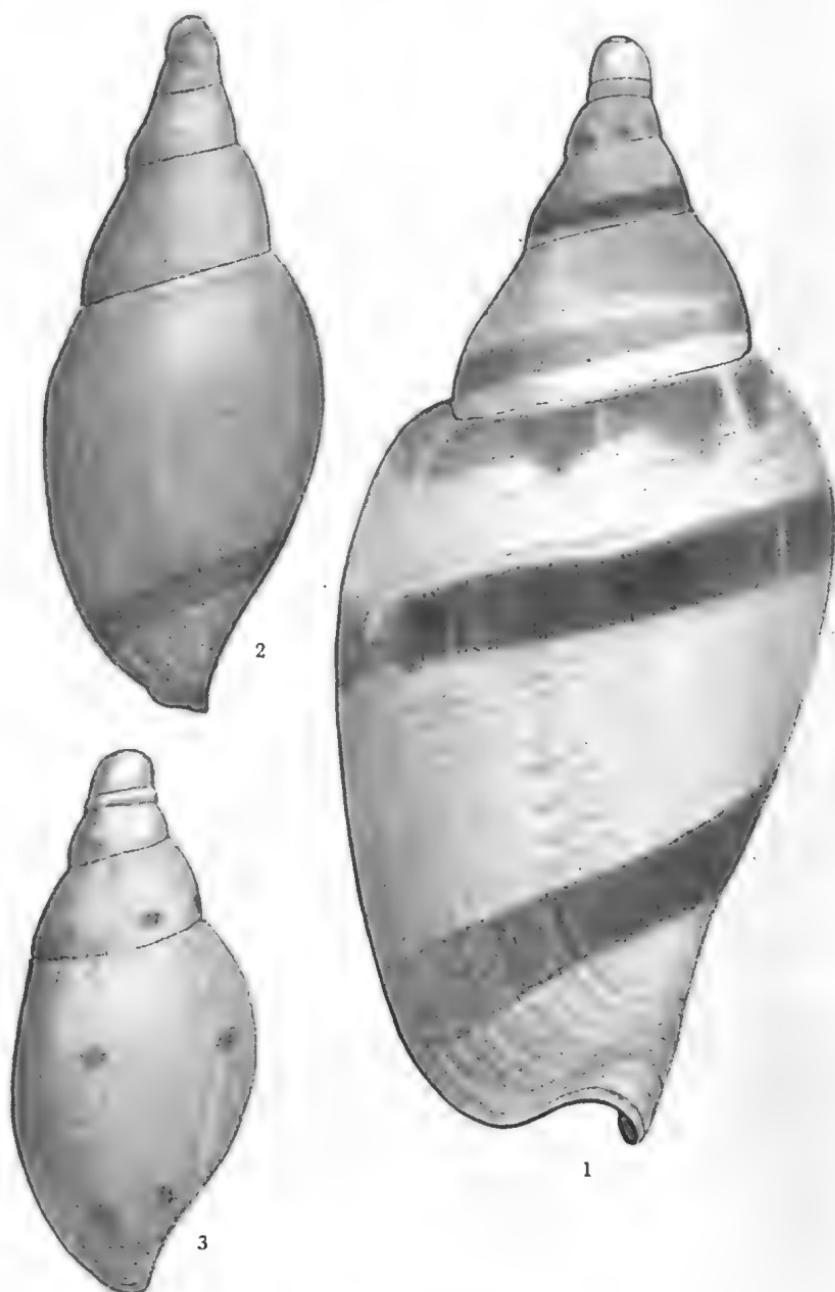
*Gyrineum armeniacum*  
 dorsal; ventral, and side views  
 J. T. S. 212 Aug 1918 (figs 103-442, 493, 512-12).  
 N44 F.N.S. FEB 1932



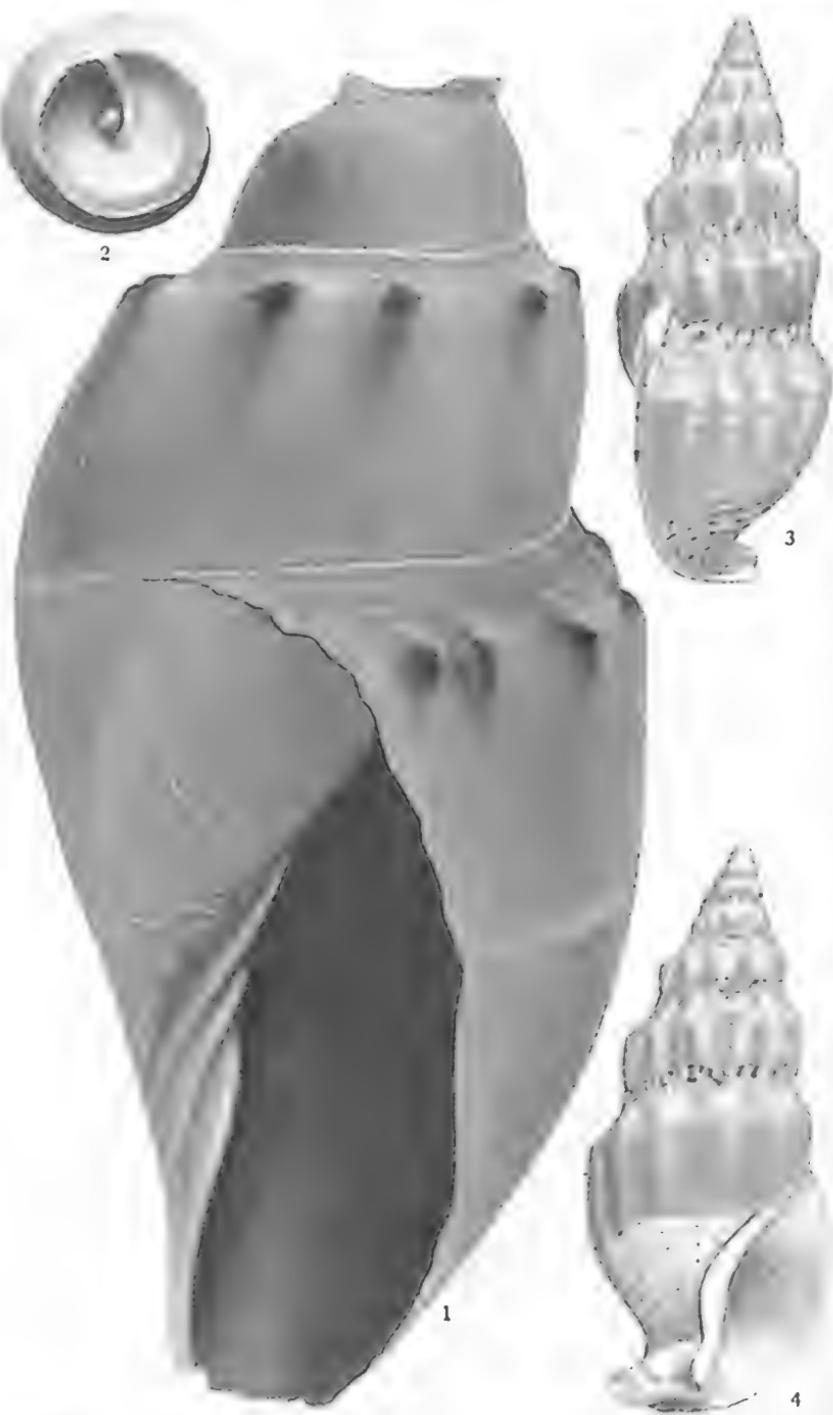




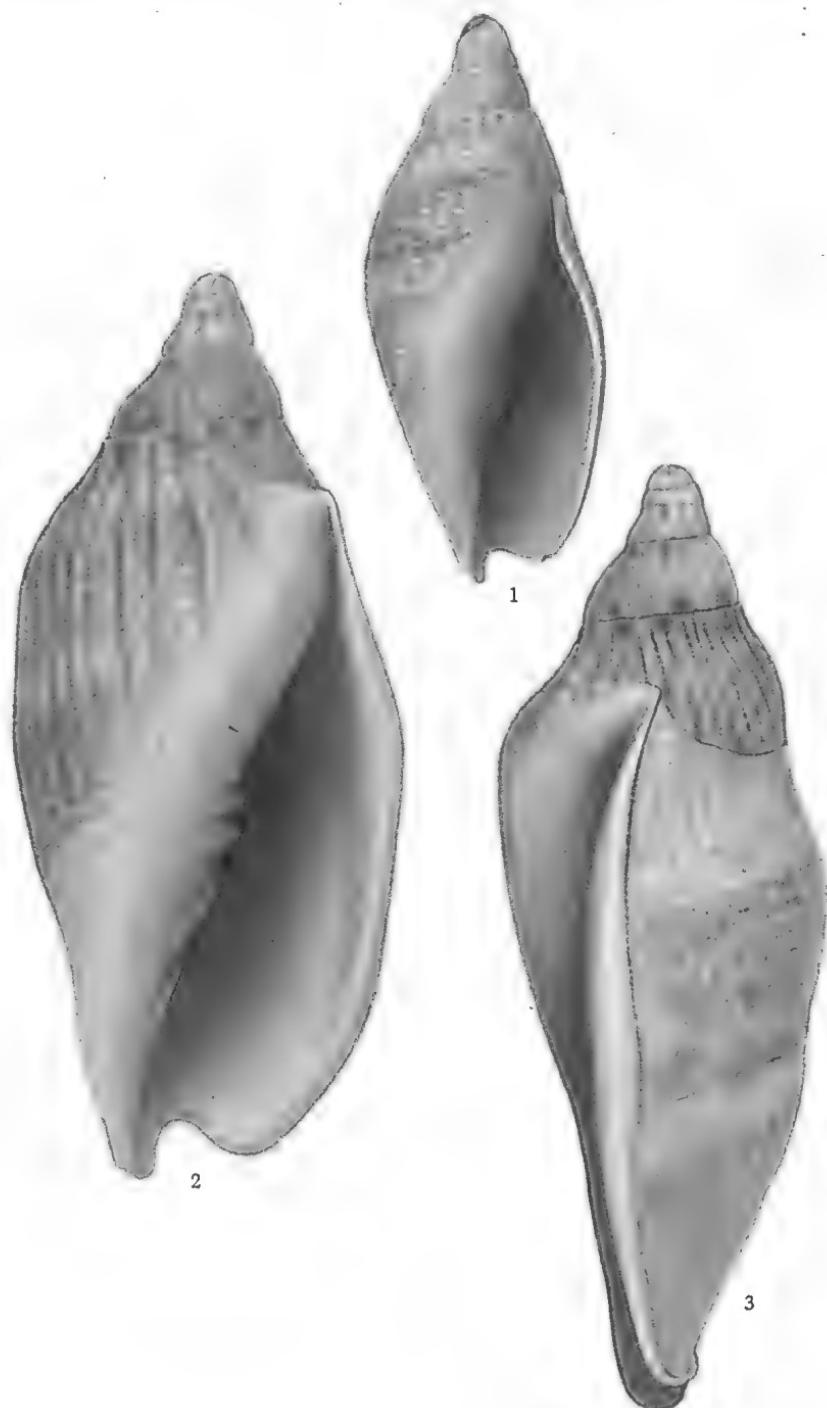




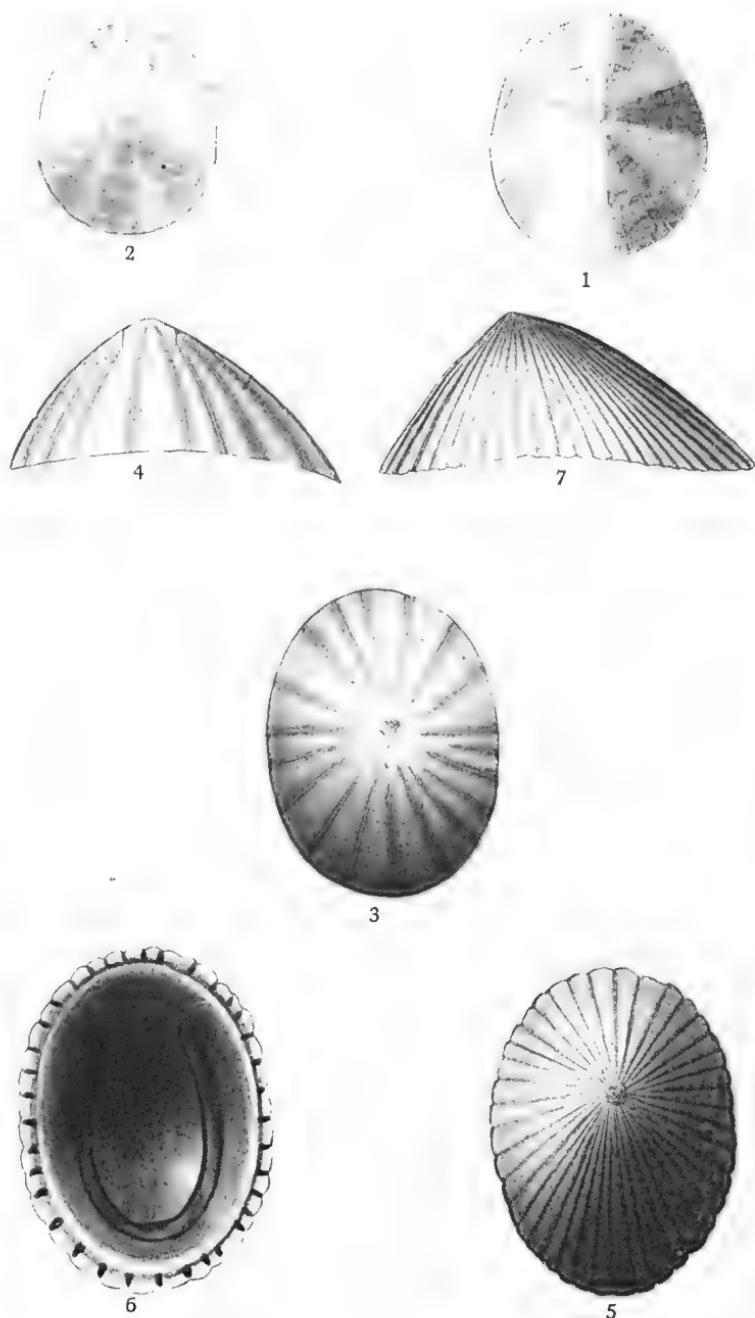
j B. Metcalf  
Passey

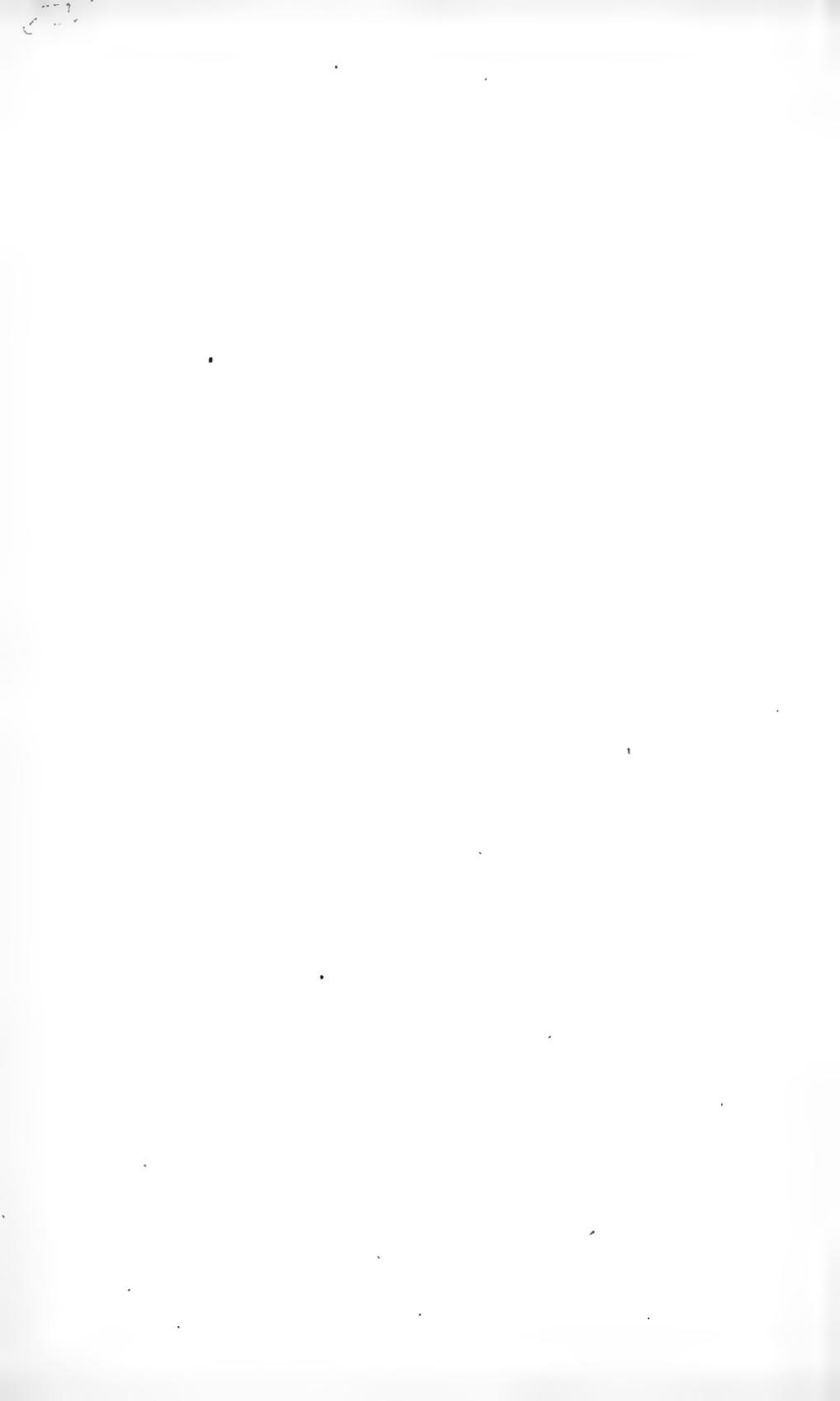


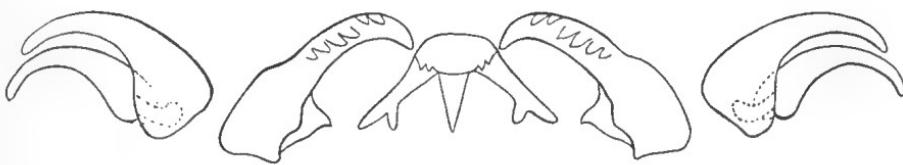
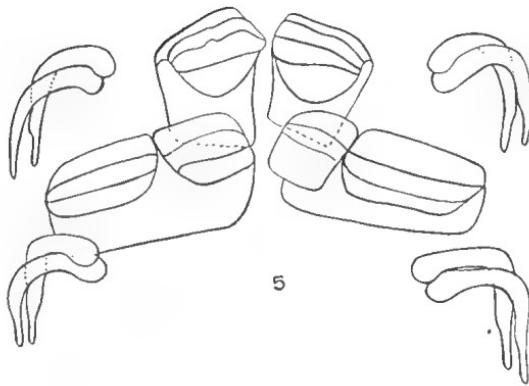
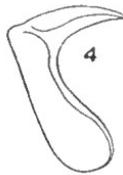
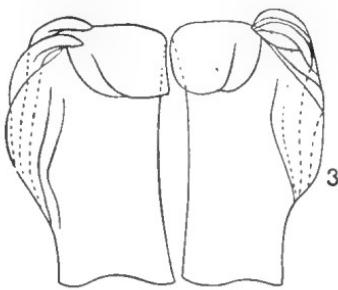
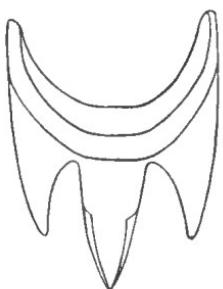












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Aug 1918

**NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA, WITH  
DESCRIPTIONS OF NEW SPECIES.—PART XVI.**

By Jos. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[From "Transactions of the Royal Society of South Australia,"  
vol. xlvi., 1918.]

[Read August 8, 1918.]

This paper is a continuation of the series from page 201, of vol. xxxvi., of 1912, and deals with the genera *Cypraea*, *Trivia*, and *Erato*. After enumerating for a species its localities in South Australia, those in Western Australia are given as far north as Fremantle, where I may have taken it. Further, where in the same area I have obtained species not found in South Australia, they have been listed, so as to indicate which pass round Cape Leeuwin and which do not.

*AUSTROCypraea reevei*, Sowerby.

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*Cypraea reevei*, Gray: Sowerby's Conch. Illus., 1832, fig. 52, Cat. Cypraeidae, 1837, No. 15; Adcock: Handlist Aquatic Moll. S. Austr., 1893, p. 5, No. 153; Shaw: Proc. Mal. Soc., 1909, vol. viii., p. 302; Verco: Trans. Roy. Soc. S. Austr., 1912, vol. xxxvi., p. 210; Hedley: Jour. Roy. Soc. W. Austr., 1916 (1915), p. 199.

*Habitat*.—Sowerby (1837) gives Garden Island, mouth of the Swan River, Western Australia.

Taken off Newland Head, Encounter Bay, 20 fathoms, 1 dead; in Backstairs Passage, 20 fathoms, 1 dead; Yankalilla beach (Adcock); Cape Spencer beach (Tate); Corny Point beach, Spencer Gulf; St. Francis Island beach, 1 perfect; 100 fathoms, 90 miles west of Eucla, 3 alive; 72 to 120 fathoms, 120 miles west of Eucla, 1 dead; Hopetoun beach, 2 (A. Parkinson); Esperance beach, 4; Albany beach, 3; Rottnest Island, 3.

When mature the length may be 40 mm. or only 28 mm. The relative width may vary, being 25 mm., with lengths of 36 and 39 mm. Of three taken alive in 100 fathoms one is of a uniform delicate cream colour, one a lavender-grey, and one of a rather deeper tint with four obscure darker transverse bands. The beautiful example from St. Francis Island is of a dark slate colour, with close set antero-posterior lighter lines, 4 faint broad transverse darker bands, and the whole surface finely malleated. Some more solid older specimens are of a light chestnut colour with darker chestnut bands. All have the pink tips front and back.

It is a rare shell in South Australia, and appears not to reach the Victorian boundary, is distinctly more common at

the western end of the South Australian coast, and is found as far north as Rottnest. It is taken alive on the beach at Albany, and also in 100 fathoms, so that it has a wide range of depth.

**Cypraea angustata**, Gmelin.

*Cypraea angustata*, Gmelin: Syst. Nat., 1790, p. 3421, No. 40; Sowerby: Conch. Illus., 1836, fig. 105; Cat. Cyp., 1837, p. 10, No. 99; Kiener: Coq. Viv., vol. 1, 1845, p. 43, No. 36, pl. xxxv., figs. 2, 2a; Reeve: Conch. Icon., vol. iii., 1846, pl. xvii., fig. 91; Angas: Proc. Zool. Soc., 1865, p. 170; Sowerby: Thes. Conch., 1870, p. 30, No. 101, pl. xxviii., figs. 296, 297; Ten. Woods: Proc. Roy. Soc. Tas., 1878 (1877), p. 35; Brazier: Proc. Linn. Soc. N.S. Wales, vol. v., 1881 (1880), p. 499; Adcock: Handlist Aq. Moll. S. Austr., 1893, p. 5, No. 156; Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 568, pl. xxi., figs. 1-3; Pritchard and Gatliff: Proc. Roy. Soc. Vic., vol. xii. (N.S.), 1900 (1899), p. 181; Hedley and May: Records Austr. Mus., vol. vii., No. 2, 1908, p. 111; Hedley: Austr. Assoc. Adv. Sci., 1909, p. 361; Shaw: Proc. Mal. Soc. Lond., vol. viii., 1909, p. 306.

Gmelin gives *hab.*(?); Sowerby, in 1837, "South Africa"; Kiener, Indian seas and shores of New Holland; Angas gives Guichen Bay, South Australia, and adds, "It is a Tasmanian species, not extending into the South Australian gulfs, where several allied species have their habitat"; Ten. Woods gives "common" in Tasmania; Brazier questions the locality of a specimen from Moreton Bay, or the identification of the shell. But Hedley cites it from Queensland; and Hedley and May record it from 100 fathoms off Cape Pillar, Tasmania.

Sowerby, in his Thesaurus, ventures the opinion that *comptoni*, *deelivis*, *piperita*, and *bicolor* are all varieties of *angustata*; while Beddome creates the varieties *subcarnea*, Ancey, *maya*, and *albata*. Pritchard and Gatliff discuss this question fully, and declare all to be varieties. I have no hesitation in supporting these authors and in confirming Sowerby's further suspicion as to the varietal position of *C. pulicaria*, Reeve. *C. angustata*, Gmelin, the typical ventricose form, is not very common in South Australia, but is most so in the eastern part, as MacDonnell Bay, where occurs the very elegant form figured by Reeve, pl. xvii., fig. 91, covered with a bluish-white enamel. It is found, however, along the whole coastline of South Australia to the west, as far as explored, and at Albany up to 245 mm. in length. Like all its varieties it may have several transverse ridges.

**C. angustata**, Gmelin, var. **comptoni**, Gray.

*Cypraea comptoni*, Gray: Voy. "Fly," ii., App., 1847, p. 356, pl. i., f. 3; Angas: Proc. Zool. Soc., 1865, p. 170; Brazier: Proc. Zool. Soc., 1872, p. 85; Ten. Woods: Proc. Roy. Soc. Tas., 1878 (1877), p. 35; Adcock: Handlist Aq. Moll. S. Austr., 1893, p. 5,

No. 157; Henn: Proc. Linn. Soc. N.S. Wales, vol. xx., 1896, p. 520; Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 568, pl. xxi., figs. 15, 16; Hedley: Journ. Roy. Soc. N.S. Wales, vol. li. (1917), 1918, M. 70.

*Habitat*.—Gray gives Port Essington; Angas, Port Lincoln, Gulf St. Vincent, and Port Adelaide Creek; Brazier, Twofold Bay, New South Wales, Cape Riche, King George Sound, and north coast of Tasmania; Pritchard and Gatliff, Victoria. It is more common along the South Australian coast than the typical *C. angustata*. It is found alive in rock pools, and has been dredged alive up to 14 fathoms. It may be 21 mm.  $\times$  12·5  $\times$  9·5, or reach 27  $\times$  16·5, as at St. Francis Island. Several have been taken at Albany up to 20 mm., but none on the western coast of Western Australia.

~~*Cypraea angustata*~~  
*C. angustata*, Gmelin var. *declivis*, Sowerby.

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*Cypraea declivis*, Sowerby: Thes. Conch., vol. iv., 1870, p. 31, No. 103, figs. 287, 328\*, 329\*; Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 571, pl. xxi., figs. 12-14; Pritchard and Gatliff: Proc. Roy. Soc. Vict., vol. xii. (N.S.), (1899), 1900, p. 184.

*Habitat*.—Sowerby gives Tasmania; Pritchard and Gatliff, Victoria. The plump ventricose form, with crowded large dark-brown spots along the columellar side, smaller lighter peppered spots all over the dorsum, is found at MacDonnell Bay, 2, 25 mm.  $\times$  18  $\times$  13·5; the narrow form, Esperance Bay, 1.

*Cypraea angustata*, Gm., var. *mayi*, C. E. Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 570, pl. xxi., figs. 4, 5, 6, 7.

Taken at MacDonnell Bay; at Sleaford Bay, 5, up to 26 mm.  $\times$  17  $\times$  13·5, and down to 16·5 mm.  $\times$  12  $\times$  8·25; also at Venus Bay, up to 29 mm.  $\times$  19  $\times$  14·5; at Albany, 7, up to 25 mm.

*Cypraea angustata*, Gm., var. *subcarnea*, Ancey, C. E. Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxi., 1896, part 3, p. 467; also *op. cit.*, vol. xxii., 1898, p. 571, pl. xxi., figs. 8, 9, 10.

*Habitat*.—Tasmania (Beddome); Victoria (Pritchard and Gatliff). This is quite rare in South Australia, but is taken in MacDonnell Bay and Lacepede Bay; and one was found at Esperance, in Western Australia.

*Cypraea angustata*, Gm., var. *albata*, C. E. Beddome: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 571, pl. xxi., figs. 11, 11a.

His type locality is Derwent River, Tasmania; but he reports a specimen from South Australia. There is a narrow pure white form like an albino—*C. comptoni*, Gray—from MacDonnell Bay and Gulf St. Vincent; also a cream-coloured plumper form without spots or dorsal bands. Others may

have small reddish-brown spots on each margin, and others in addition may be dusted with very minute brownish specks. Some have the cream colour slightly tinged with brown, and yet without dots or bands, or have dots only, or faint transverse brown bands in addition. Others may be browner still, with faint brown bands, marginal dots fairly many and distinct or absent, and so merge into *C. subcarnea*.

*Cypraea angustata*, ~~Menke~~, var. *piperita*, Gray. 573

*Cypraea piperita*, Gray: Zool. Journ., vol. i, 1825, p. 498; Sowerby: Conch. Illus., Cyp. Cat., 1837, No. 100, fig. 24, 1832; Menke: Moll. Nov.-Holl., 1843, p. 30; Reeve: Conch. Icon., vol. iii., 1846, pl. xvii., Sp. 87; Angas: Proc. Zool. Soc., 1865, p. 170, and 1867, p. 206; Sowerby: Thes. Conch., vol. iv., 1870, p. 31, No. 104, figs. 285, 286; Ten. Woods: Proc. Roy. Soc. Tas., 1878 (1877), p. 35; Tryon: Man. Conch., vol. vii., 1885, p. 189; Adcock: Handlist Aq. Moll. S. Austr., 1893, p. 5, No. 158; Beddoe: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 574, pl. xxi., figs. 17, 18; Pritchard and Gatliff: Proc. Roy. Soc. Vict. (N.S.), vol. xii., 1900 (1899), p. 184; Tate and May: Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 374; Hedley: Proc. Roy. Soc. W. Austr., vol. i., p. 199; Hedley: Proc. Roy. Soc. N.S. Wales, vol. li., Supp., 1918, p. M. 70.

Sowerby, in 1870, first suggested its conspecificity with *C. angustata*, and Pritchard and Gatliff supported him. Woods, Beddoe, and Tate and May kept them separate. Hedley unites them, and my examples completely intergrade.

Gray gives its habitat as New Holland; Sowerby as New South Wales; Menke as Western Australia; Angas as Port Lincoln and Port Jackson; Ten. Woods as Tasmania; Pritchard and Gatliff as Victoria.

Taken on the beach at Normanville and American River, Kangaroo Island. Dredged alive in Backstairs Passage in 13, 15, 18, 20, and 23 fathoms; in Gulf St. Vincent in 5 fathoms; in Investigator Strait, 13, 15, and 17 fathoms; and dead but fresh in 25 fathoms off Beachport; also on the beach at Esperance 1, and at Albany 4.

*Cypraea angustata*, ~~Menke~~, var. *bicolor*, Gaskoin. 576

*Cypraea bicolor*, Gaskoin: Proc. Zool. Soc., 1848, p. 91, 92; Angas: Proc. Zool. Soc., 1865, p. 170; Sowerby: Thes. Conch., vol. iv., 1870, p. 31, No. 104, figs. 288, 289, 533; Tryon: Man. Conch., vol. vii., 1885, p. 189; Adcock: Handlist Aq. Moll. S. Austr., 1893, p. 5, No. 159; Beddoe: Proc. Linn. Soc. N.S. Wales, vol. xxii., 1898, p. 576; Pritchard and Gatliff: Proc. Roy. Soc. Vict. (N.S.), vol. xii., 1900 (1899), p. 184; Tate and May: Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 374.

Sowerby, in 1870, made it a variety of *C. piperita*, Gray; Tryon, Pritchard and Gatliff, and Tate and May correctly concur.

Its habitat was given by Gaskoin as Australia; Angas localized it more definitely at Kangaroo Island and Port Adelaide Creek; Beddome extended it to Tasmania; and Pritchard and Gatliff recorded it from Victoria.

Taken on the beach, Kangaroo Island, Gulf St. Vincent and Spencer Gulf, Fowler Bay (Tate), and Albany 3. Dredged alive in Gulf St. Vincent, 7 fathoms 6, 17 fathoms 3. One is a *facsimile* of Sowerby's fig. 289, a small ventricose form from Miss Saul's collection; others match fig. 533, "Mr. Hugh Owen's beautiful shell from South Australia."

*Cypraea angustata*, Gmelin, var. *pulicaria*, Reeve. *angustata* not *veronis*, it is *pulicaria*

*Cypraea pulicaria*, Reeve: Proc. Zool. Soc., 1845, p. 23; Conch. Icon., vol. iii., 1846, pl. xvii., Sp. 84; Gaskoin: Proc. Zool. Soc., 1848, p. 97; Sowerby: Thes. Conch., 1870, p. 31, No. 105, pl. xxviii., figs. 290, 291; Tryon: Man. Conch., vol. vii., 1885, p. 189, pl. xvi., figs. 59, 60; Tate and May: Proc. Linn. Soc., vol. xxvi., 1901, p. 445; Hidalgo: Mon. Cyp. Viv., 1907, p. 480; Verco: Trans. Roy. Soc. S. Austr., vol. xxxvi., 1912, p. 210; Hedley: Journ. Roy. Soc. W. Austr., vol. i., 1916, p. 199.

Its habitat was unknown to Reeve and Gaskoin; Sowerby and Tryon give it as Australia; Tate and May deny Tasmania, as affirmed by Paetel; Hidalgo rightly cites Geographie Bay. It has not been recorded from Victoria. E. H. Matthews has 5 worn examples from Corny Point.

Dredged in Gulf St. Vincent or Spencer Gulf, 3; one has the articulated cross bands, and sparse large dots along the sides and over the dorsum; a second has the sparse large dots on the sides and dorsum, and the articulated bands on the left base and side, but on the dorsum the middle two bands have their spots joined by narrow brown bars, while the spots of the anterior and posterior bands become blotches, and the whole surface is finely peppered and reticulated brown. Forty miles west of Eucla, in 100 to 116 fathoms, 1 was dredged alive; 80 miles west, in 80 fathoms, 1 alive, and in 100 fathoms, 2 alive, up to 20 mm.; and 90 miles west, in 100 fathoms, 4 alive, the largest 23·5 mm. long without spots of any kind, one 21 mm. with many spots on the thickened outer lip alone, one of 19 mm. with spots scattered sparsely over the dorsum and sides, none on the base or outer lip, one 19 mm. with spots scattered sparsely over the dorsum, sides, and thickened outer lip.

Esperance 3, one with the middle two rows of spots joined by a brown bar and so grading into *C. bicolor*, but with the numerous side dots coming well over the dorsum. Albany 2, up to 21·5 mm.  $\times$  12  $\times$  9·5, typical in shape and ornament, with four equidistant cross bands of articulated squarish brown spots, and numerous smaller rounded dots on

both sides, crowded towards the base, and becoming more discrete on the dorsum. Another also typical in shape with spots at both margins, also sparsely scattered over the dorsum; but these are nearly obscured by a very fine general brown reticulation, in which are faintly visible four slightly browner cross lines, due to greater thickness of the reticulation at these places.

Ellensbrook beach 16, ranging from 14·5 mm.  $\times$  8  $\times$  6·25 to 20 mm.  $\times$  11  $\times$  8·5, yellowish-brown. These all have transverse rows of square spots on the dorsum forming four interrupted or articulated narrow bands, of which the front one is often obsolete or absent, less frequently the back one is obsolete. Besides these there are many rather large brown dots, most numerous and deeply coloured on the thickened outer lip, numerous but more discrete on the left side of the shell, extending upwards to the centre of the dorsum. These are mostly roundish and irregularly scattered, but some tend to be squarish, and even to run in transverse lines between the bands of squarish spots. Rottnest (Mrs. Simpson) 2, up to 16·25 mm.

*C. pulicaria* seems to be the extreme western variant of *C. angustata*, which is the extreme eastern form, while *comptoni* and *piperita* and *bicolor* are most abundant in the middle southern Australian area. *C. angustata* is more common in Tasmania than elsewhere, and becomes gradually scarcer to the west, while *C. pulicaria* is common on the western coast of Western Australia, is rare on its southern coast, becomes very rare further east, and disappears beyond Kangaroo Island. Shaw says *C. pulicaria*, "on account of its narrower and more elongate form and finer teeth, should be regarded as a good species, and not a variety of *C. angustata*." But in well-marked *C. pulicaria* the teeth vary from 22 to 30 in shells of the same size, and in well-marked *C. angustata-comptoni* they may be just as numerous and as fine, and the shape may be as narrow and long in the latter as in the former. The colour ornament in typically shaped *C. pulicaria* also varies from uniform white through all gradations of the flea-bitten dots, and through the articulated bands and very fine pepperings and fine reticulations into *piperita* and *bicolor*, and so through *comptoni* into *declinis* and *angustata*.

*Cypraea (Coila) friendii* *Scotia* 579  
*Cyprae friendii*, Gray. 1831

*Cypraea friendii*, Gray: Zool. Miscel., 1831, vol. viii., p. 29; Gray: Descrip. Cat. of Shells, Cyp., 1832, p. 5, No. 32; Menke: Moll. Nov.-Holl., 1843, p. 29; Shaw: Proc. Mal. Journ. Lond., 1909, vol. viii., p. 303; Hedley: Journ. Roy. Soc. W. Austr., vol. i., 1916, p. 199.

*Cypraea scottii*, Broderip: Zool. Journ., vol. v., 1831, p. 330, pl. xiv., figs. 1-3; Sowerby: Conch. Illus., Cat. Cyp., 1837, Sp. 33, fig. 44, 1832; Kiener: Coq. Viv., vol. i., p. 110, No. 99, 1845, pl. xiv., fig. i., 1843; Reeve: Conch. Icon., vol. iii., 1845, pl. iv., fig. 10; Ten. Woods: Proc. Roy. Soc. Tas., 1878 (1877), p. 35; Tryon: Man. Conch., vol. vii., 1885, p. 176, pl. ix., figs. 29, 30; Adcock: Handlist Aq. Moll. S. Austr., p. 5, No. 154; Tate and May: Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 445; Sowerby: Thes. Conch. vol. v., 1870, p. 18, No. 54, figs. 47, 48; Shaw: Proc. Mal. Soc., vol. viii., 1909, p. 303 (gives Gaskoin, not Broderip, as the author).

This shell has generally been referred to as *C. scottii*, Brod., but Gray has priority of publication. Broderip gives as the habitat the Strait of Sunda, near Angia, Java, and Kiener the Moluccas; but Sowerby, in 1837, Garden Island, Swan River. Menke in 1843 confirms this in his "Western Coast of New Holland." Reeve cites not only Swan River for the typical shell, but Port Lincoln for his variety B, which is evidently *C. thersites*, Gaskoin. Ten. Woods writes, "In more than one work it is spoken of as Tasmanian, but I cannot find any trace of this species among collections." So also Tate and May reject it for Tasmania. It was listed by Adcock for South Australia. Mr. E. H. Matthews has a shell from Yorke Peninsula which was regarded as *C. scottii*; it is a somewhat elongated example of *C. thersites*.

I took it on Bunbury beach. Captain Irvine, of Fremantle, told me that several specimens may sometimes be obtained from the piers of the jetty, apparently feeding on the coral-like incrustations. Tate's collection contained 5 examples ranging up to 81 mm. x 40 x 34 mm. from Geographe Bay. At Esperance Captain Douglas gave me 4 individuals said to have been gathered locally. These were much longer, wider, and higher.

*not Thersites*) ZOOL. FRIENDII is a species  
*Cypraea friendii*, Gray, var. *Thersites*, Gaskom.

*Cypraea thersites*, Gaskoin: Zool. Proc., 1848, p. 90; Angas (Aricia): Proc. Zool. Soc., 1865, p. 170; Sowerby: Thes. Conch., vol. iv., 1870, p. 18, No. 55, pl. viii., figs. 49, 50; Tryon: Man. Conch., vol. vii., 1885, p. 176, pl. ix., figs. 31, 32; Adcock: Handlist Aq. Moll. S. Austr., 1893, p. 5, No. 155; Verco: Trans. Roy. Soc. S. Austr., vol. xxxvi., 1912, p. 209; Hedley: Journ. Roy. Soc. W. Austr., 1916 (1915), p. 200.

FRIENDII  
IS A SEP-  
ARATE  
SPECIES

Gaskoin's habitat is "Salt Creek, Yorke Peninsula, South Australia, on clusters of zoophytes at 2-3 fathoms." Angas cites this as "the only place where it has hitherto been found." But Reeve's variety B of *C. scottii* from Port Lincoln is almost certainly this species. It has since been taken in numbers at Black Point, Gulf St. Vincent, and in Hardwicke Bay, Spencer Gulf. One was dredged by me full

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grown at the entrance to American River, Kangaroo Island, and 2 fragments eroded, in 40 fathoms off Beachport; also in the Great Australian Bight, alive, in 72 and 100 fathoms.

When quite young, up to 25 mm. in length, the shell is thin, pyriform, with a depressed exsert spire, and unicoloured yellow, the spire tinged with brown. Then dark brown spots and splashes up to 2 or 3 mm. in size appear over the anterior third or from the spire to the notch. At 30 mm. the colour becomes light purplish-brown, with two obscure yellowish-white transverse bands about 2 mm. wide, with about two-fourths of the shell between them. At 40 mm. the purplish tint is deeper and the spots are still discrete, or the whole dorsum may be clouded with spots of irregular shape and obscure margins running into or superimposed on one another. At 50 mm. the spots may be nearly effaced, and besides the two pale cross bands the indistinct spots may be seen to form obscure interrupted dark mahogany transverse bands. At 65 mm. the shell has grown more globular, being 50 mm. wide and 40 mm. high; it is still very thin; the outer lip is inflected, slightly convex, 14 mm. wide, and edentulous; the dorsum may have about 6 transverse dark rusty mahogany bands. After this the labrum flattens through callous deposits at the latero-labral margin, and teeth appear along the labral edge and the opposite columellar margin. The labral teeth become more valid and extend slightly over the inferior surface. They seem very often to extend to the extreme outer border, but this is an illusion due to blackish-brown rays, which extend from the border, and become narrow as they approach the teeth. These rays are absent from the columellar side, where round or oval spots are found. The teeth on both sides of the aperture are white or nearly so; also the central part of the base as well, but this varies greatly in degree, in some cases the base is almost wholly dark brown. As a rule the bordering latero-basal callus is nearly black. It may extend in varying degrees over the dorsum, and in some examples the whole dorsal surface may be very dark, producing what is popularly known as "the black cowry."

Reeve's variety B of *C. seattii* from Port Lincoln was evidently the form which Gaskoin subsequently described as *C. thersites*. It is now degraded to a varietal position.

*C. friendii* from Geographe Bay is a much narrower and lower shell than the South Australian *C. thersites*, and might properly be regarded as a different species, but for the Esperance shells, which relatively are broader and higher than the former, but not proportionately so broad and high as the latter.

*C. thersites* and *C. friendii* are separate species.  
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The relative measurements are as follow:—

Western Australian Shells.

From Geographe Bay:—

1.  $81 \text{ mm.} \times 40 \times 34 = 100 \times 49.4 \times 42.$
2.  $59 \text{ mm.} \times 33 \times 26.5 = 100 \times 56 \times 45.$
3.  $73 \text{ mm.} \times 41 \times 33 = 100 \times 56.2 \times 45.2.$

From Esperance:—

4.  $94 \text{ mm.} \times 53 \times 40 = 100 \times 56.4 \times 45.75.$
5.  $86 \text{ mm.} \times 53 \times 40 = 100 \times 61 \times 46.5.$
6.  $81 \text{ mm.} \times 50 \times 40 = 100 \times 63 \times 50.$

South Australian Shells.

1.  $75 \text{ mm.} \times 47 \times 38 = 100 \times 62.66 \times 50.66.$
2.  $69 \text{ mm.} \times 44 \times 35.5 = 100 \times 63.77 \times 51.3.$
3.  $80 \text{ mm.} \times 52 \times 41.5 = 100 \times 65 \times 51.9.$
4.  $76 \text{ mm.} \times 50 \times 41 = 100 \times 66 \times 54.$
5.  $72 \text{ mm.} \times 50 \times 41 = 100 \times 69.45 \times 56.95.$
6.  $75 \text{ mm.} \times 55 \times 42.5 = 100 \times 73.3 \times 56.6.$

From these data it is plain that there is an uninterrupted gradation between the narrow and low form of *C. friendii* to the broadest and highest example of *C. thersites*; and while the narrowest of the former kind and the broadest of the latter are very unlike, the intermediate examples are too alike to be separable, although the author of the Monograph Cyp, in Thes. Conch., vol. iv., 1870, p. 18, writes in reference to them, "The two . . . although curiously allied, differ so much in proportions that they run no risk of being confounded with each other."

No distinctive feature can be found in the number or character of the teeth. The labral teeth in *C. thersites* vary from 23 to 28, and in *C. friendii* from 21 to 28; the columellar from 9 to 15, and from 6 to 13. The spire in the Geographe Bay specimens is much longer than in South Australian *C. thersites*, but in the Esperance Bay examples it is intermediate. Looking at the shell from above and behind, the ascending posterior channel in the Geographe Bay specimen lies well to the right of the spire, and rising above it turns to the left over the spire, whereas in some of the South Australian shells it ascends directly to, and only to the point of the spire. In other examples, however, it turns to the right of the very short spire, while in one of the Esperance shells it goes directly to its apex. So with the lateral compression of the shell base in front and its angular deviation to the right, there is the same gradation. The width of the aperture is no diagnostic. This is as narrow in the extreme western form as in the extreme eastern, while in the Esperance specimens it is wider. The base is usually very darkly and completely coloured in *C. friendii*, while in *C. thersites* it is generally in large part white; but sometimes

it is no more completely or darkly coloured in that than in this. Usually the lateral borders are less *callous*, and less deeply blackish-brown in *C. friendii*, but this is not sufficient to specifically separate them. Their specific identity seems certain.

*see p 493* *a variety of C. hesitata (not L.)*  
*var. armeniaca*—Verco: *Cypraea umbilicata*, Sowerby:  
*var. armeniaca*, n. v.; Verco: *Trans. Roy. Soc. S. Austr.*, vol.  
 xxxvi., 1912, p. 211; Iredale: *Proc. Mal. Journ.*, vol. xi, parts  
 ii. and iii., 1916, p. 93; Hedley: *Journ. Roy. Soc. N.S. Wales*,  
 vol. li., (1917) 1918, *Suppl.*, p. M. 70.

Iredale proves the name *C. umbilicata*, Sowerby, to be preoccupied by Dillwyn, and renames it *C. hesitata*; so *C. armeniaca* becomes the species name, and *hesitata* the varietal. Though the latter is found to the east of Australia as far north as New South Wales, and is not very uncommon in Tasmania, yet it has not been taken along the southern coast of Victoria or South Australia, nor in my dredging off this coast up to 300 fathoms. *C. armeniaca* was dredged in the Great Australian Bight, somewhere west of Eucla, and therefore in Western Australian waters. *variety of hesitata*

*Cypraea caput serpentis*, Linne: *Syst. Nat.*, 1758, p. 720; Hedley: *Journ. Roy. Soc. W. Austr.*, vol. i., 1916 (1915), p. 198; Hedley: *Proc. Roy. Soc. N.S. Wales*, vol. li, *Suppl.*, 1918, p. M. 70.

This is recorded from New South Wales and Queensland, and has been sent to me from Cape Banks, Byron Bay, and Moreton Bay; from Cambridge Gulf, Broome, Carnarvon, Geraldton, and Pelsart Island. I have taken it at Rottnest Island and at Ellensbrook. It was given to me as from Albany, but I did not find it myself when collecting there, and am disposed to think it does not occur there, nor elsewhere along the southern coast of Australia.

*Cypraea vitellus*, Linne: *Syst. Nat.*, x., 1758, p. 721; Angas: *Proc. Zool. Soc.*, 1867, p. 205; Brazier: *Proc. Zool. Soc.*, 1872, p. 83; Hedley: *Journ. Roy. Soc. W. Austr.*, 1916 (1915), p. 200.

Menke localizes it on the western shore of New Holland; Angas in Port Jackson, Brazier makes Botany Bay its southern limit; Gross' collection has examples from Moreton Bay and North Queensland; Tate's North-west Australia; and I have taken it at Ellensbrook, south of Cape Naturaliste. Two fine specimens were given to me by a gentleman, who had them given to him at Albany, but this locality is probably incorrect; I found none there.

*Cypraea helvola*, Linne: *Syst. Nat.*, 1758, p. 724; Brazier: *Proc. Zool. Soc.*, 1872, p. 84; Hedley: *Austr. Assocn. Adv. Sci.*, 1909, p. 362; also *Journ. Roy. Soc. W. Austr.*, 1916 (1915), p. 199.

Brazier records it from Bellinger River beaches, New South Wales; Hedley from Queensland. It has been sent to me from Carnarvon, North-west Australia. Brazier cites it from Rowley Shoals, and I have taken it at Ellensbrook. It has not been found on the southern shores.

**Cypraea cibraria**, Linne: Syst. Nat., 1767, p. 1178; also Gmelin's Edition, Tom. i., pars. vi., 1789, p. 3414, No. 80; Gray: Zool. Journ., vol. iv., 1828, p. 79; Shirley: Proc. Roy. Soc. Q'land, vol. xxiii., 1911 (1910), p. 99.

Gray gives New Holland as its habitat; Shirley cites Moreton Bay. Ellensbrook, west coast of Western Australia, one beach specimen in good condition, colour slightly faded. Hedley, in Jour. Roy. Soc. W. Austr., vol. i., 1916 (1914-1915), p. 199, records *C. fallax*, Smith, Ann. Mag. Nat. Hist. (5), viii., 1881, p. 441, W. Austr.; Tryon, in Man. Conch. 1885, vol. vii., p. 190, writes:—"C. fallax, E. A. Smith, is an unfigured variety, credited to Western Australia. It differs from the normal shell in being larger, more pyriform, white spots smaller and less clearly defined; they appear to blend into the fawn colour of the dorsum, which is paler than in *C. cibraria*." My shell is rather less than 1·1 inch, the maximum of *C. cibraria* given by Tryon, and less still than my cabinet specimens of this species, which reach 1·25 inch. The relative sizes of my example, and the largest of these are 27 mm. × 16 × 13 and 30 mm. × 18 × 14·5. Its dimensions, therefore, do not suggest *C. fallax*, nor does the colour ornament, for the spots are typically large, and allowing for some fading of the yellow-brown foundation tint are typically distinct. It seems, therefore, to be a typical *C. cibraria*. It has not been found on the southern shore of Australia.

*Elatiria merces* 522  
~~Trivia australis~~, Lamarck.

*Cypraea australis*, Lamarck: Anim. s. Vert., 1822, vol. vii., p. 401; Verco: Trans. Roy. Soc. S. Austr., vol. xxxvi., 1912, p. 215; Hedley: Journ. Roy. Soc. W. Austr., 1916 (1915), p. 200.

It has been taken along the shore of South Australia from MacDonnell Bay to Fowler Bay and on St. Francis Island. It reaches 16 mm. in length, and is well and typically coloured. Dredged off Beachport, 2 in 40 fathoms, up to 11·5 mm., 2 in 110 fathoms, and in 200 fathoms 1 showing colour spots; off Cape Jaffa, in 90 fathoms 1 eroded; off Cape Borda, Kangaroo Island, in 55 fathoms 2 very poor, in 62 fathoms 2 dead, up to 11·5 mm., typically coloured.

In the Great Australian Bight, Federal trawler "Endeavour," 40 miles west of Eucla in 110 to 116 fathoms,

1 recent, translucent, uncoloured; 80 miles west of Eucla in 80 fathoms 2 dead, up to 11 mm., showing colour at the ends; in 81 fathoms 3 recent, coloured on back and ends; 90 miles west of Eucla in 100 fathoms, 1 eroded. Taken on beach at Esperance up to 13·5 mm.; at Albany up to 12 mm.; at Ellensbrook, very many brilliantly coloured; on Rottnest Island up to 11 mm.; Cottesloe beach up to 14 mm.

*not lobus*

**Trivia globosa**, Sowerby. (*Cypraea globosa*, Gray: M.S.S. Descrip. Cat. of Cyp., p. 14, No. 121). Sowerby: Conch. Illus. Cat., Sp. 117, 1837, fig. 34, 1832; Sowerby: Thes. Conch., vol. iv., 1870, p. 47, No. 167, pl. xxxv., figs. 466, 467; Angas: Proc. Zool. Soc., 1871, p. 94; Hedley: Austr. Assoc. Adv. Sci., 1909, p. 362; Shaw: Proc. Mal. Soc., vol. viii., 1909, p. 308.

Dredged by Federal trawler "Endeavour" 40 miles west of Eucla, in Great Australian Bight, in 72 fathoms 1; at 80 miles west in 81 fathoms 1. In King George Sound in 12 to 14 fathoms 3 dead, but in perfect condition, 4 mm., 3 mm., and 2·5 mm. long (Dr. Verco).

*Lachryma* <sup>a</sup>  
~~Erato~~ *bimaculata*, Tate

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*Erato bimaculata*, Tate: Adelaide Philos. Soc., 1878, vol. i., p. 88; Tate and May: Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 375, pl. xxiii., fig. 6.

Recorded by Tate on the east and west coast of Gulf St. Vincent and on the east coast of Spencer Gulf. Dredged 4 alive in 5 fathoms Gulf St. Vincent; in Backstairs Passage in 17 fathoms 11, in 22 fathoms many dead, 10 quite fresh; off Corny Point, Spencer Gulf, in 30 fathoms 1 dead.

Albany beach 1; off Bunbury, dredged, in 15 fathoms 1 dead; Rottnest Island beach 2, typical (Dr. Verco).

~~Erato~~ *Lachryma* <sup>denticulata</sup> 523

*Erato lachryma*, Gray: Descrip. Cat., 1832, p. 17; Sowerby: Conch. Illus. Erato, p. 15, Sp. 5, 1837, fig. 48, 1832 (*Lachryma trifasciata*, Humphrey, M.S.S.); Sowerby: Thes. Conch., vol. iii., 1866, p. 82, Sp. 5, figs. 4, 5, 6; Reeve: Conch. Icon., 1865, fig. 9; Tate: Trans. Roy. Soc. S. Austr., 1881, vol. iv., p. 140; Tate and May: Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 375; Hedley: Austr. Assoc. Adv. Sci., 1909, p. 362.

*Erato denticulata*, Pritchard and Gatliff: Proc. Roy. Soc. Vict., vol. xii. (N.S.), 1900, p. 133.

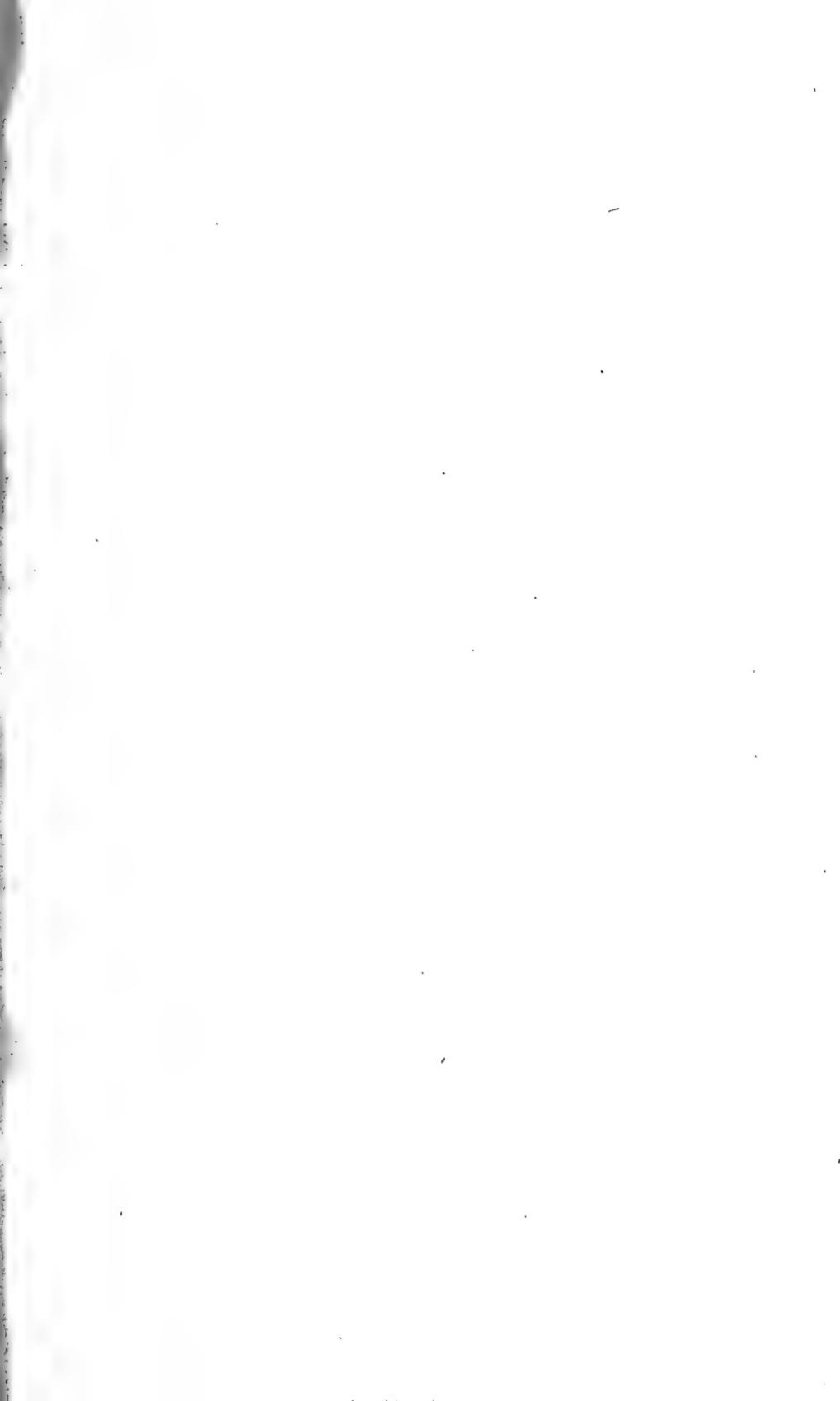
Sowerby's type of 1832 was from New South Wales; in the Thes. Conch. the species was recorded from Japan in 1866. Tate identified it from Fowler Bay (Mrs.

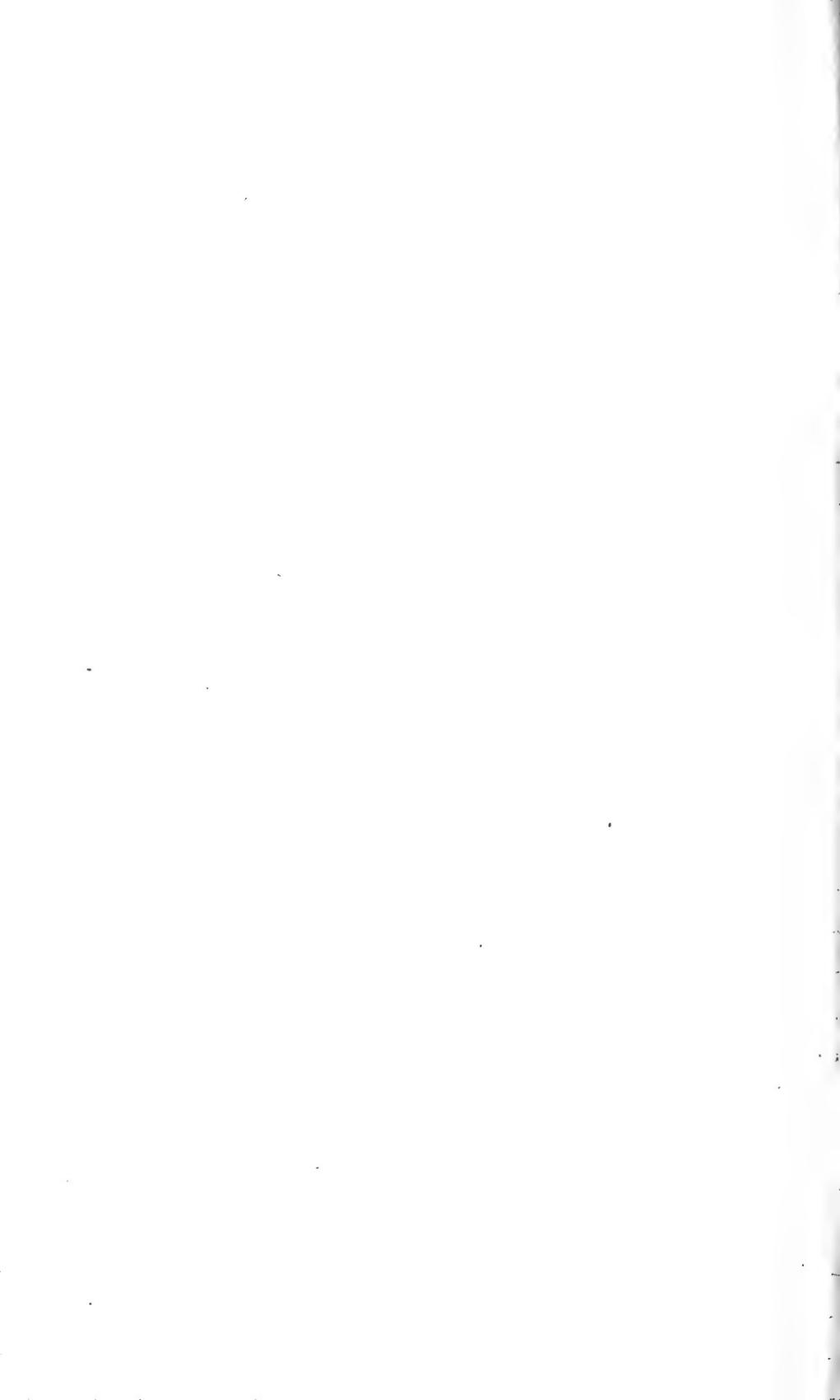
Richards) and Tasmania (Petterd); Pritchard and Gatliff described it as a new species from Victoria; and Hedley listed it for Queensland.

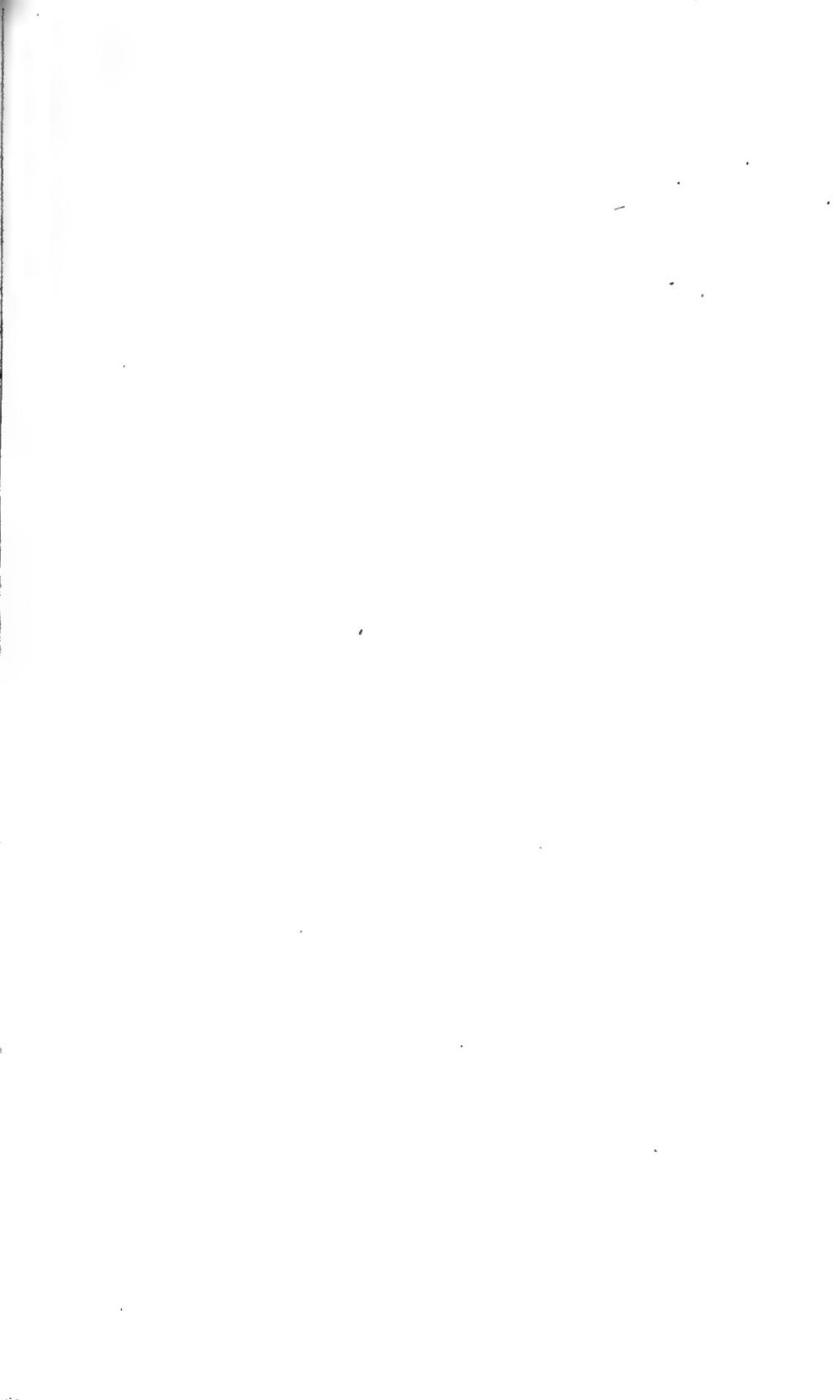
Taken on the beach at Venus Bay, Port Le Hunte, and St. Francis Island, up to 7 mm. long. Dredged dead in Encounter Bay, Backstairs Passage, Gulf St. Vincent and Spencer Gulf, Investigator Strait, from 6 to 22 fathoms, alive in 17, 20, and 22 fathoms Backstairs Passage. Dredged off Beachport in 40 fathoms 4 poor and 3 moderate almost bleached, in 49 fathoms 1 large and quite fresh, in 110 fathoms 13 very poor up to 7 mm., in 150 fathoms 1 very poor, in 200 fathoms 2 poor; off Cape Jaffa in 130 fathoms 2 dead; off Cape Borda in 55 fathoms 33 nearly bleached up to 6·25 mm., 1 dead but fresh; off Neptune Islands in 45 fathoms 3 poor.

Taken on Esperance beach 2; dredged in 35 fathoms off Hopetoun 8 dead; on Albany beach 1; dredged in King George Sound in 12 to 14 fathoms 1 immature dead, and in 35 fathoms 1 broken; on Ellensbrook beach 1 of 7 mm. and 1 of 4·5 mm. in length; on Yallingup beach 6; at Bunbury on the beach 1 of 5·75 mm. length, in 5 fathoms 1 dead, in 22 fathoms 3 dead but fresh (1 immature); Rottnest Island 17 up to 7 mm. long, and typically coloured.















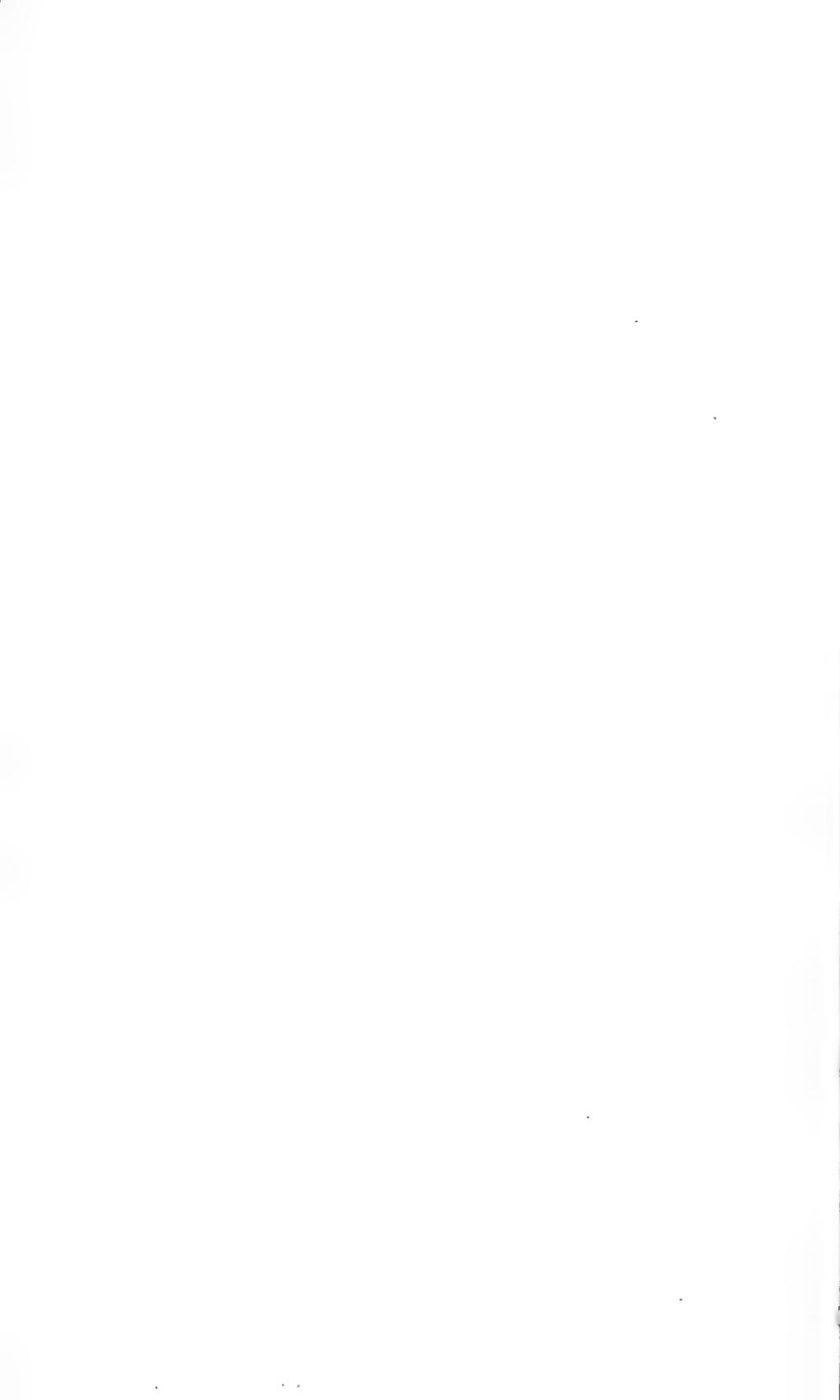


















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